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HUGO GERNSBACH, Editor

25 Science-fiction **PLUS**

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By Murray Leinster

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SKEPTICISM IN SCIENCE-FICTION

... Who are the disbelievers in science-fiction ... ?

By HUGO GERNSBACH

DR. ALBERT EINSTEIN once made the profound observation that "common sense" is really nothing more than an accumulation of prejudices laid down in the mind prior to the age of eighteen. Every new idea we encounter in later years must combat this accretion of "self-evident" concepts.

These truths are only too well understood by those who have been active in science-fiction during the past two decades. One constantly encounters a host of prejudices against various phases of science-fiction, often from the very people who stand to gain most from it.

There is, for instance, a segment of scientists who have little or no patience with science-fiction. They scoff at it, they ridicule it, and consider it beneath their dignity. This feeling is quite understandable if we but consider that many of the purveyors of science-fiction are partly responsible for this state of affairs.

For the past ten years, unfortunately, a very large percentage of literature masqueraded under the name of science-fiction, when actually the bulk of the endeavor was undiluted fantasy or hopped-up fairytales—with little or no science.

This, however, is only one of the reasons for the prejudice against science-fiction that we encounter not too infrequently. For, make no mistake—during the past twenty-five years there has been printed a vast array of most excellent science-fiction stories and novels, with the accent on science—good science, too. Many of these books and stories have not escaped the eye and mind of scientists, engineers, technicians, and other professionals in their respective fields.

Nevertheless, there remains a constant stream of antagonism against science-fiction by many scientific people—not a major percentage of the whole, but still a disturbing sector.

What is the real reason for this puzzling state of affairs? And should not every technically-minded adult welcome science-fiction with an open mind?

The answers are not difficult to find. With few exceptions, the younger men—say, up to thirty—are usually enthusiastic and avid science-fiction readers. Their scientific, educated minds welcome the new and unusual ideas. A new and

revolutionary idea is a powerful stimulus, nearly always a challenge to the young mind—providing that the idea is scientifically sound.

That is probably also the reason why the world's great inventions have, with few exceptions, been made by men before they were thirty-five.

As he grows older, man loses much of his enthusiasm, his drive. He becomes more cautious, much more skeptical. New ideas are no longer such a compelling challenge. They simply mean more work, more effort. Hence, the mature and aging mind actually *resents* the new and the untried. He begins to dislike the multitude of new technical ideas that pour out incessantly in ever-increasing amounts. They now bewilder him—in truth, he can no longer cope with them, *they overwhelm him*. He finally finds himself no longer able to absorb the new.

Even the exceptional older man, who is able to digest a mass of new ideas and to hold his own with men half his age, nevertheless has other handicaps. He has his own work that often is his livelihood, his profession. Once he has absorbed all his professional literature—which is often enormous—he has left relatively little free time in which to read more of the same, in another genre, such as science-fiction. Understandably, most older detectives probably do not read detective stories as a steady fare.

Then, too, the aging mind as a rule becomes very impatient with new theories—particularly with untried ones—even if their science is generally accepted.

Thus, during the past two years, I have either talked or corresponded with over a score of rather prominent older scientists and engineers. Surprisingly enough, the majority were appalled at the present-day furor of space-flying. Most of them voiced their complete disbelief that man could ever land on another planet and return alive. Others thought that unmanned interplanetary guided flights to the moon *might* be possible in 100 to 150 years from now—with perhaps *one or two out of fifty* flights succeeding.

The reader will draw his own conclusions from the above discussion and whatever moral—if any—it may contain.



Nightmare Planet

by MURRAY LEINSTER

(Illustrations by Tom O'Reilly)

In science-fiction, as in all categories of fiction, there are stories that are so outstanding from the standpoint of characterization, concept, and background development that they remain popular for decades. Two such stories were Murray Leinster's *The Mad Planet* and *Red Dust*. Originally published in 1923, they have been reprinted frequently both here and abroad. They are now scheduled for book publication. Especially for this magazine, Murray Leinster has written the final story in the series. It is not necessary to have read the previous stories to enjoy this one. Once again, Burl experiences magnificent adventures against a colorful background, but to the whole the author has added philosophical and psychological observations that give this story a flavor seldom achieved in science-fiction.



Under his real name of Wall Fitzgerald Jenkins, the author has sold to *The Saturday Evening Post*, *Curtain*, *Today's Evening*, in fact every important publication in America. He has had over 1200 stories published, 35 books and 55 science-fiction stories anthologized. His writing earned him a living in *Who's Who in America*.

THE DIRECTORY-SHIP *Tethys* made the first landing on the planet. L216¹². It was a goodly world, with an ample atmosphere and many seas, which the nearby sun warmed so lavishly that a perpetual cloud-bank hid them and all the solid ground from view. It had mountains and islands and high plateaus. It had day and night and rain. It had an equable climate, rather on the tropical side. But it possessed no life.

No animals roamed its solid surface. No vegetation grew from its rocks. Not even bacteria struggled with the stones to turn them into soil. No living thing, however small, swam in its oceans. It was one of that disappointing vast majority of otherwise admirable worlds which was unsuited for colonization solely because it had not been colonized before. It could be used for biological experiments in a completely germ-free environment, or ships could land upon it for water and supplies of air. The water was pure and the air breathable, but it had no other present utility. Such was the case with an overwhelming number of Earth-type planets when first discovered in the exploration of the galaxy. Life simply hadn't started there.

So the ship which first landed upon it made due note for the Galactic Directory and went away, and no other ship came near the planet for eight hundred years.

But nearly a millennium later, the Seed-Ship *Orana*

arrived. It landed and carefully seeded the useless world. It circled endlessly above the clouds, dribbling out a fine dust comprised of the spores of every conceivable microorganism that could break down rock to powder and turn the powder to organic matter. It also seeded with moulds and fungi and lichens, and everything that could turn powdery primitive soil into stuff on which higher forms of life could grow. The *Orana* seeded the seas with plankton. Then it, too, went away.

Centuries passed. Then the Ecological Preparation Ship *Ludred* swam to the planet from space. It was a gigantic ship of highly improbable construction and purpose. It found the previous seeding successful. Now there was soil which swarmed with minute living things. There were fungi which thrived monstrously. The seas stank of teeming minuscule life-forms. There were even some novelties on land, developed by strictly local conditions. There were, for example, *paramecium* as big as grapes, and yeasts had increased in size so that they bore flowers visible to the naked eye. The life on the planet was not aboriginal, though. It had all been planted by the seed-ship of centuries before.

The *Ludred* released insects. It dumped fish into the seas. It scattered plant-seeds over the continents. It treated the planet to a sort of Russell's Mixture of living things. The real Russell's Mixture that blend of simple elements in the proportions found in suns.

This was a blend of living creatures, of whom some should certainly survive by consuming the now habituated flora, and others which should survive by preying on the first. The planet was stocked, in effect, with everything it could be hoped might live there.

But at the time of the *Ludred's* visit of course no creature needing parental care had any chance of survival. Everything had to be able to care for itself the instant it burst its egg. So there were no birds or mammals. Trees and plants of divers sorts, and fish and crustaceans and insects could be planted. Nothing else.

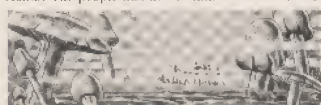
The *Ludred* swam away through emptiness.

There should have been another planting, centuries later still, but it was never made. When the Ecological Preparation Service was moved to Algal IV, a file was upset. The cards in it were picked up and replaced, but one was missed. So that planet was forgotten. It circled its sun in emptiness. Cloud-banks covered it from pole to pole. There were hazy markings in certain places, where high plateaus penetrated the clouds. But from space the planet was featureless. Seen from afar, it was merely a round white ball—white from its cloud-banks—and nothing else.

But on its surface, in its lowlands it was nightmare.

Especially was it nightmare—after some centuries—for the descendants of the human beings from the "space-liner *Icarus*, wrecked there some forty-odd generations ago. Naturally, nobody anywhere else thought of the *Icarus* any more. It was not even remembered by the descendants of its human cargo, who now inhabited the planet. The wreckage of the ship was long since hidden under the seething, furiously striving fungi of the soil. The human beings on the planet had forgotten not only the ship but very nearly everything how they came to this world, the use of metals, the existence of fire, and even the fact that there was such a thing as sunlight. They lived in the lowlands, deep under the cloud-bank, amid surroundings which were riotous, swarming, frenzied horror. They had become savages. They were less than savages. They had forgotten their high destiny as men.

DAWN CAME. Grayness appeared overhead and increased. That was all. The sky was a blank, colorless pall, merely mottled where the clouds clustered a little thicker or a little thinner, as clouds do. But the landscape was variegated enough! Where the little group of people huddled together, there was a wide valley. Its walls rose up and up into the very clouds. The people had never climbed those hill-sides,



They had not even traditions of what might lie above them, and their lives had been much too occupied to allow of speculations on cosmology. By day they were utterly absorbed in two problems which filled every waking minute. One was the securing of food to eat, under the conditions of the second problem, which was that of merely staying alive.

There was only one of their number who sometimes thought of other matters, and he did so because he had become lost from his group of humans once, and had found his way back to it. His name was Burl.

and his becoming lost was pure fantastic accident, and his utilization of a fully inherited power to think was the result of extraordinary events. But he still had not the actual habit of thinking. This morning he was like his fellows.

All of them were soaked with wetness. During the night—every night—the sky dripped slow, spaced, solemn water-drops during the whole of the dark hours. This was customary. But normally the humans hid in the mushroom-forests, sheltered by the toad-stools which now grew to three man-heights. They denuded in small openings in the tangled mass of parasitic growths which flourished in such thickets. But this last night they had camped in the open. They had no proper habitations of their own. Caves would have been desirable, but insects made use of caves, and the descendants of insects introduced untold centuries before had shared in the size-increase of *paramecium* and yeasts and the few true plants which had been able to hold their own. Mining-wasps were two yards long, and humble-bees were nearly as huge, and there were other armored monstrosities which also preferred caves for their own purposes. And of course the humans could not build habitations, because anything men built to serve the purpose of a cave would instantly be preempted by creatures who would automatically destroy any previous occupants.

The humans had no fixed dens at any time. Now they had not even shelter. They lacked other things, also. They had no tools save salvaged scraps of insect-armor—great sawtoothed mandibles or razor-pointed leg-shells—which they used to pry apart the edible fungi on which they lived, or to get at the morsels of meat left behind when the brainless lords of this planet devoured each other. They had not even any useful knowledge, except desperately accurate special knowledge of the manners and customs of the insects they could not defy. And on this special morning they concluded that they were doomed. They were going to be killed. They stood shivering in the open, waiting for it to happen.

It was not exactly news. They had had warning days ago, but they could do nothing about it. Their home valley, to be sure, would have made any civilized human being shudder merely to look at it, but they had considered it almost paradise. It was many miles long, and a fair number wide, and a stream ran down its middle. At the lower end of the valley there was a vast swamp, from which at nightfall the thunderously deep-bass croakings of giant frogs could be heard. But that swamp had kept out the more terrifying creatures of that world. The thirty-foot centipedes could not cross it or did not choose to. The mastodon-sized tarantulas which ravaged so much of the planet would not cross it save in pursuit of prey. So the valley was nearly a haven of safety.

True, there was one clotho spider in its ogre's castle nearby, and there was a labyrinth spider in a minor valley which nobody had ever ventured into, and there were some—not many—praying-mantises as tall as giraffes. They wandered terribly here and there. But most members of insect life here were absorbed in their own affairs and ignored the humans. There was an ant-city, whose foot-long warriors competed with the humans as scavengers. There were the bees, trying to eke out a livelihood from the great, cruciform flowers of the giant cabbage-plants and the milkweeds—when water-lilies in the swamps did not bear their four-foot blooms. Wasps sought their own prey. Flies were consumers of corruption, but even the flies two feet in length would shy away from a man who waved his arms at it. So this valley had

seemed to these people to be a truly admirable place.

But a fiend had entered it. As the gray light grew stronger the shivering folk looked terrifiedly about them. There were only twenty of the people now. Two weeks before there had been thirty. In a matter of days or less, there would be none. Because the valley had been invaded by a great gray furry spider!

THERE WAS a stirring, not far from where the man-folk trembled. Small, inquisitive antennae pipped into view among a mass of large-sized pebbles. There was a violent stirring, and gravel disappeared. Small black things thrust upward into view and scurried anxiously about. They returned to the spot from which they had emerged. They were ants, opening the shaft of their city after scouting for danger outside. They scratched and pulled and tugged at the plug of stones. They opened the ant-city's artery of commerce. Strings of small black things came pouring out. They averaged a foot in length, and they marched off in groups upon their divers errands. Presently a group of huge-jawed soldier-ants appeared, picking their way stolidly out of the opening. They waited stupidly for the workers they were to guard. The workers came, each carrying a faintly greenish blob of living matter. The caravan moved off. The humans knew exactly what it was. The green blobs were aphids—plant lice; ant-cow—small creatures sheltered and guarded by the ants and daily carried to nearby vegetation to feed upon its sap and yield inestimable honeydew.

Something reared up two hundred yards away, where the thin mist that lay everywhere just barely began to fade all colorings before it dimmed all outlines. The object was slender. It had a curiously humanlike head. It held out horrible sawtoothed arms in a gesture as of benediction—which was purest mockery. Something smaller was drawing near to it. The colossal praying mantis held its pose, immovable. Presently it struck downward with lightning speed. There was a cry. The mantis rose erect again, its great arms holding something that stirred and struggled helplessly, and repeated its unconsounded outcry. The mantis ate it daintily as it struggled and screamed.

The humans did not watch this tragedy. The mantis would eat a man, of course. It had. The only creatures immune to its menace were ants, which for some reason it would not touch. But it was a mantis' custom after spotting its prey to wait immobile for the unlucky creature to come within its reach. It preferred to make its captures that way. Only if a thing fled did the mantis pursue with deadly ferocity. Even then it dined with monstrous deliberation as this one dined now. Still, mantises could be seen from a distance and hidden from. They were not the terror which had driven the humans even from their hiding-places.

It had been two weeks since the giant hunting-spider had come through a mountain pass into this valley to prey upon the life within it. It was gigantic even of its kind. It was deadliness beyond compare. The first human to see it froze in terror. It was disaster itself. Its legs spanned yards. Its fangs were needles-sharp and feet in length—and poisoned. Its eyes glittered with insatiable, insane blood-lust. Its roving was ten times more deadly to the unarmed folk than a Bengal tiger loose in the valley would have been.

It killed a man the very first day it was in the valley, leaving his sucked-dry carcass, and going on

to destroy a rhinoceros-beetle and a cricket whose deep-bass cries were horrible—and proceeded down the valley, leaving only death behind it. It had killed other men and women since. It had caught four children. But even that was not the worst. It carried worse, more deadly, more inevitable disaster with it.

Because, bumping and bouncing behind its abdomen as it moved, fastened to its body with cables of coarse and discolored silk, the hunting-spider dragged a burden which was its own ferocity many times multiplied. It dragged an egg-bag. The bag was larger than its body, four feet in diameter. The female spider would carry this burden—chirishing it—until the eggs hatched. Then there would be four to five hundred small monsters at large in the valley. And from the instant of their hatching they would be just such demonic creatures as their parents. They would be small, to be sure. Their legs would span no more than a foot. Their bodies would be the size of a man's fist. But they could leap two yards, instantly they reached the open air, and their inch-long fangs would be no less venomous, and their ferocity would be in madness, in insanity and in stark maniacal horror equal the great gray fiend which had begot them.

The eggs had hatched. Today—now—this morning they were abroad. The little group of humans no longer hid in the mushroom-forests because the small hunting-spiders sought frenziedly there for things to kill. Hundreds of small lunatic demons roamed the valley. They swarmed among the huge toad-stools, killing and devouring all living things large and small. When they encountered each other they fought in slaying, panting fury, and the survivors of such duels dined upon their brothers. Small truffle-beetles died, clicking futilely. Infinite small grubs, newly hatched from luteally eggs and barely six inches long, furnished them with tidbits. But they would kill anything and feast upon it.

A woman had died yesterday, and two small gray devils battled murderously above her corpse.

Just before darkness a huge yellow luteally had flung itself agonizedly aloft, with these small dark horrors clinging to its body, feasting upon the juices of the body their poison had not yet done to death.

And now, at daybreak, the humans looked about despairingly for their own deaths to come to them. They had spent the night in the open lest they be trapped in the very forests that had been their protection. Now they remained in clear view of the large gray murderer should it pass that way. They did not dare to hide because of that ogreish creature's young, who panted in their blood-lust as they scurried here and there and everywhere.

As the day became established, the clouds were gray—gray only. The night-mist thinned. One of the younger women of the tribe—a girl called Sava—saw the huge thing far away. She cried out, clicking. The others saw the monster as it leaped upon and murdered a vividly colored caterpillar on a milkweed near the limit of vision. The milkweed was the size of a tree. The caterpillar was four yards long. While the enormous victim writhed as it died, not one of the humans looked away. Presently all was still. The hunting-spider crouched over its victim in obscene absorption. Having been madness incarnate, it now was the very exemplar of a horrid glutony.

Again the humans shivered. They were without shelter. They were without even the concept of arms. But it was morning, and they were alive, and therefore they were hungry. Their desperation was absolute, but desperation to some degree was a part of

their lives. Yet they shivered and suffered. There were edible mushrooms nearby, but with the deadly small reptiles of the hunting-spider giant roaming everywhere, any movement was as likely to be deadly as standing still to be found and killed. The humans murmured to one another, fearfully.

But there was the young man called Burl, who had been lost from his tribe and had found it again. The experience had changed him. He had felt stirrings of atavistic impulses in recent weeks—the more especially when the young girl Saya looked at him. It was not normal, in humans conditioned to survive by flight, that Burl should feel previously unimagined hunger for fury—a longing to hate and do battle. Of course men sometimes fought for a particular woman's favor, but not when there were deadly insects about. The carnivorous insects were not only peril, but horror unfaceable. So Burl's sensations were very strange. On this planet a courtship did not usually involve displays of valor. A man who was a more skillful forager than the foot-long ants was an acceptable husband. Warriors did not exist.

Burl did not even know what a warrior was. Yet today the sullen, unreasonable impulses to conduct what he could not quite imagine were very strong. He knew all the despairing terror the others felt. But he also was hungry. The sheer doom that was upon his group did not change the fact that he wanted to eat, nor did it change the fact that he felt queer when the girl Saya looked at him. Because she was terrified, the same sort of atavistic process was at work in her. She looked to Burl. Men no longer served as protectors against enemies so irresistible as giant spiders. It was not possible. But when Burl realized her regard his chest swelled. He felt a half-formed impulse to beat upon it. His new-found reasoning processes told him that this particular fear was different in some fashion from the terrors men normally experienced. It was. This was a different sort of emergency. Most dangers were sudden and either immediately fatal or somehow avoidable. This was different. There was time to savor its meaning and its hopelessness. It seemed as if it should be possible to do something about it. But Burl was not able, as yet, to think what to do. The bare idea of doing anything was unusual, now. Because of it, though, Burl was able to disregard his terror when Saya regarded him yearningly.

THE OTHER MEN muttered to each other of the sudden death in the mushroom thickets. No less certain death now feasted on the dead yellow caterpillar. But Burl abruptly pushed his way clear of the small crowd and scowled for Saya to see. He moved toward the nearest fungus-thicket. An edible mushroom grew at its very edge. He marched toward it, swaggering. Men did not often swagger on this planet.

But then he ceased to swagger. His approach to the mingled mass of toadstools and lesser monstrosities grew slower. His feet dragged. He came to a halt. His impulse to combat conflicted with the facts of here and now. His flesh crawled at the thought of the grisly small beasts which now might be within yards. These thickets had been men's safest hiding-places. Now they were places of surest disaster.

He stopped, with a coldness at the pit of his stomach. But as it was a new experience to be able to have danger come in a form which could he foreseen, so Burl now had a new experience in that he was ashamed to be afraid. Somehow, having tacitly undertaken to get food for his companions, he could

not bring himself to draw back while they watched. But he did want desperately to get the food in a hurry and get away from there.

He saw a gruesome fragment of a tragedy of days before. It was this emptied, scraped, hollow leg-shell of a beetle. It was horrendously barbed. Great, knife-edged spines lined its edge. They were six inches in length. And men did not have weapons any more, but they sometimes used just such objects as this to dismember defenseless giant slugs they came upon.

Burl picked up the hollow shell of the leg-joint. He shook it free of clinging moulds—and small things an inch or two in length dropped from it and scurried frantically into hiding. He moved hesitantly toward the edible mushroom which would be food for Saya and the rest. He was four yards from the thicket. Three. Two. He needed to move only six feet, and then slice at the fleshy mushroom-head, and he would be at least an admirable person in the eyes of Saya.

Then he cried out thinly. Something small, with insane eyes, leaped upon him from the edge of a giant toadstool.

It was, of course, one of the small beasts which had hatched from the hunting-spider's egg-bag. It had grown. Its legs now spanned sixteen inches. Its body was as large as Burl's two fists together. It was big enough to enclose his head in a cage of loathsomeness formed by its legs, while its fangs tore at his scalp. Or it could cover his chest with its abominableness while its poison filled his veins, and while it feasted upon him afterward. . . .

He flung up his hands in a paralytic, horror-stricken attempt to ward it off. But they were clenched. His right hand did not let go of the leg-section with its razor-sharp barbs.

The spider struck the beetle-leg. He felt the impact. Then he heard gaspings and bubblings of fury. He heard an indescribable cry which was madness itself. The chitinous object he had picked up now shook and quivered of itself.

The spider was impaled. Two of its legs were severed and twitched upon the ground before him. Its body was slashed nearly in half. It writhed and struggled and made beastly sounds. Thin, colored fluids dripped from it. A disgusting musky smell filled the air. It strove to reach and kill him as it died. Its eyes looked like flames.

Burl's arm shook convulsively. The small thing dropped to the ground. Its remaining legs moved frantically but without purpose.

It died, though its leg continued to twitch and stir and quiver.

Burl remained frozen, for seconds. It was an acquired instinct; a conditioned reflex which humans had to develop on this world. When danger was past, one stayed desperately still lest it return. But Burl's thoughts were now not of horror but a vast astonishment. He had killed a spider! He had killed a thing which would have killed him! He was still alive!

And then, being a savage, and an animal, as well as a human being, he acted according to that highly complicated nature. As a savage, he knew with strict practicality that it was improbable that there was another hairy spider nearby. If there had been, they would have fought each other. As an animal, he was again hungry. As a human being, he was vain.

So he moved closer to the toadstool-thicket and put his hand out and broke off a great mass of the one edible mushroom at the edge. A noisome broth poured out and little maggots dropped to the ground and writhed there in it. But most of what he had broken off was sound. He turned to take it to Saya.

Then he saw the dropped weapon and the spider. He picked up the weapon.

The spider's legs still twitched, though futilely. He spiked the small body on the beetle-leg's spines. He strode back to the remnant of his tribe with a peculiar gait that even he had not often practiced.

It was rather more pronounced than a swagger. It was a strut.

They trembled when they saw the dead creature he had killed. He gave Saya the food. She took it, looking at him with bright and intense eyes. He took a part of the mushroom for himself and ate it, scowling. Thoughts were struggling to form in his mind. He was not accustomed to thinking, but he had done more of it than any other of the pitiful group about him.

He felt eyes watching him. There were five adult men in this group besides himself, and six women. The rest were children, from gangling adolescents to one mere infant in arms. They were a remarkably colorful group at the moment, had he only known it. The men wore yellow-and-gold-brown loin-cloths of caterpillar-fur, stripped from the drained carcasses of creatures that the formerly resident cloth spider had killed. The women wore cloaks of butterfly-wing, similarly salvaged from the remnants of a meal left unfinished by a finicky or engorged praying mantis. The stuff was thick and leathery, but it was magnificently tinted in purples and yellows.

Time passed. The mushroom Burl had brought was finished. Some eyes always explored the clear ground around this group. But other eyes fixed themselves upon Burl. It was not a consciously questioning gaze. It was surely not a hopeful one. But men and women and children looked at him. They marveled at him. He had dared to go and get food! He had been attacked by one of the creatures who doomed them all, but he was not dead! Instead, he had killed the spider! It was marvelous! It was unparalleled that a man should kill anything that attacked him!

THE DOOMED SMALL group regarded Burl with wondering eyes. He brushed his hands together. He looked at Saya. He wished to be alone with her. He wished to know what she thought when she looked at him. Why she looked at him. What she felt when she looked at him.

He stood up and said dourly:
"Come!"

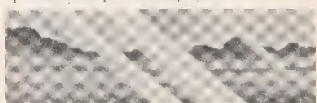
She moved timidly and gave him her hand. He moved away. There was but one way that any human being on this planet would think to move, from this particular spot just now—away from the still-feasting gigantic horror whose offspring he had killed. The folk shivered near the edge of the first upward slope of the valley wall. Burl moved in that direction. Toward the slope, Saya went with him.

Before they had gone ten yards a man spoke to his wife. They followed Burl, with their three children. Five yards more, and two of the remaining three adult men were hustling their families in his wake also. In seconds the last was in motion.

Burl moved on, unconscious of any who followed him, aware only of Saya. The procession, absurd as it was, continued in his wake simply because it had begun to do so. A skinny, half-grown boy regarded Burl's stained weapon. He saw something half-buried in the soil and moved aside to tug at it. It was part of the armor of a former rhinoceros beetle. He went on, rather awkwardly holding a weapon which might have been called a dagger, eighteen inches long, ex-

cept that no dagger would have a hand-guard nearly its own length in diameter.

They passed a struggling milkweed plant, no more than twenty feet high and already scabrous with scale and rusts upon its lower parts. Ants marched up and down its stalk in a steady, single file, placing aphids from the ant-city on suitable spots to feed, and to multiply as only parthenogenic aphids can do. But already on the far side of the milkweed, an ant-lion climbed up to do murder among them. The ant-lion was the larval form the lace-wing fly, of course. Aphids were its predestined prey.



Burl continued to march, holding Saya's hand. The reek of formic acid came to his nostrils. But that was only ants. The slope grew steeper. Massacre began behind him on the tree-sized milkweed. The ant-lion—which even when it was but half an inch long, on Earth, could bite through the skin of a man—the ant-lion reached the pasturing cows. It plunged into slaughter. It was demonic. It was such ghastly ferocity that the eggs from which its kind hatched were equipped, each one, with a plastic column to hold it well away from the object on which the clutch of eggs were laid. But for this precaution by the maternal lace-wing fly, the first of her brood to hatch would devour its unbatched brothers and sisters. This ant-lion charged into the placidly feeding aphids on the milkweed plant. It seized one and crushed it, holding it aloft so that the juices of its body would pour into the ant-lion's mouth. Almost instantly, it seemed, the milk-eyed aphid was a shrunken empty sack. The ant-lion seized another. The remaining aphids fed placidly while their enemy did vast slaughter among them.

Clickings and a shrill stridulation sounded. Warrior-ants climbed with stupid ferocity to offer battles.

Burl moved on to a minor eminence. He reached its top and looked sharply about him with the caution that was the price of existence on this world. Two hundred feet away, a small scurrying horror raged and searched among the rough-edged layers of what on other worlds was called paper-mould or rock-tripe. Here it was thick as quilting, and infinitesimal creatures dined under it. The sixteen-inch spider devoured them, making gluttonous sounds. But it was busy, and all spiders are relatively short-sighted.

Burl turned to Saya—and realized that all the human folk had followed him. One of the adults was reaching fearfully for part of a discarded cricket-shell in the ground. He tore free an emptied, sickle-shaped jaw. It was curved and sharp and deadly if properly wielded. The man had seen Burl kill something. He tried vaguely to imagine killing something himself. He was not too successful. Another man tugged at the ground. The skinny boy was practicing thrusts with his giant dagger.

Two of the adults were armed, without any clear idea of what to do with their arms. But Burl knew, now.

He regarded them angrily. He had not meant to desert them, or even to take Saya permanently from among them. Humans had little enough of satisfaction on this planet. The scared company of their kind was one of the most important. So Burl did not resent



"The boy faced it, paralyzed by horror."

that they had followed him. He did resent that they were near when he wanted to talk to Saya in what he did not yet think of as lover-like seclusion.

They halted, regarding him humbly. They had been hungry, and he had found food for them. They had been paralyzed by terror, and he had dared to move. So they moved with him. They might have followed anybody else, but only Burl had initiative—so far. They trustfully waited to follow and to imitate him for so long as panic numbed their ability to think for themselves.

Burl opened his mouth to shout furiously at them. But it was not a good idea for humans to draw attention. Spiders did not hunt by scent, but sound sometimes drew them. Burl closed his mouth again, in a

taut straight line. The men looked at him supplicatingly. They had never been lost, and so had never learned to think even a little. Burl had learned to think in a rudimentary fashion and now he suddenly perceived that it was pleasing to have all the tribe regard him so worshipfully, even if not in quite the same fashion as Saya. He was suddenly aware that even as Saya had obeyed him when he told her to come with him, they would obey. He had, at the moment, no commands to give, but he immediately invented one for the pleasure of seeing it carried out.

"I carry sharp things," he said sternly. "I killed a spider. Go find sharp things to carry."

They were a meek and abject folk, and they were desperately in need of something to do to take their minds from the uselessness of doing anything at all.

They moved to obey. Saya would have loosened her hand and obeyed, too, but Burl held her beside him. One of the women, with a child three years old, laid the child down by Burl's feet while she went fearfully to seek some fragment of a dead creature, that would meet Burl's specification of sharpness.

Burl heard a stifled scream. A ten-year-old boy stood paralyzed, staring in an agony of horror at something which had stepped from behind a misshapen fungoid object.

It was a pallidly greenish creature with a small head and enormous eyes. It was a very few inches taller than a man. Its abdomen swelled gracefully into a pleasing, leaf-like shape. The boy faced it, paralyzed by horror, and it stood stock-still. Its great, hideously spiny arms were spread out in a pose of pious benediction.

It was a partly-grown praying mantis, not very long hatched. It stood rigid, waiting benignly for the boy to come closer. If he fled, it would fling itself after him with ferocity beside which the fury of a tiger would seem kittenish. If he approached, its fanged arms would flash down, pierce his body, and hold him inextricably fast by the spikes that were worse than trap-claws. And of course it would not wait for him to die before it began its meal.

The small party of humans stood frozen. They were filled with horror for the boy. They were cast into a deep abyss of despair by the sight of a half-grown mantis, because if there was one such miniature insect-dinosaur in the valley, there would be many others. Hundreds of others. This meant there had been a hatching of them. And they were as deadly as spiders.

BUT BURL DID not think in such terms just now. Vanity filled him. He had commanded, and he had been obeyed. But now obedience was forgotten because there was this young praying mantis. If men had ever thought of fighting such a creature, it could have destroyed any number of them by pure ferocity and superiority of armament. But Burl raged. He ran toward the spot. Even mantises were sometimes frightened by the unexpected. Burl seized a lumpy object barely protruding from the ground. It looked like a rock. It was actually a flattened ball-fungus, feeding on the soil through thin white threads beneath it. Burl wrenched it free and hurled it furiously at the young monster.

Insects simply do not think. Something came swiftly at it, and the mantis flashed its ghastly arms to seize and kill its attacker. The ball-fungus was heavy. It literally knocked the mantis backward. The boy fled frantically. The insect fought crazily against the thing it thought had assailed it.

The humans gathered around Burl hundreds of yards away—again uphill. The slope of the mountain-flank was marked, here. They gathered about Burl because of an example set by the woman who had left her three-year-old child behind. Sava, in the unflinching instinct of a girl for a small child, had snatched it up when Burl left her. Then she had joined him because the instinct which had made her obey him in starting off—it was not quite the same instinct which moved the others—also bade her follow him wherever he went. The mother of the child went to retrieve her deposit. Other figures moved cautiously toward him. The tribe was reconvened.

The floor of the valley seemed a trifle obscured. The mist that hung always in the air made it seem less distinct; less actual; not quite as real as it had been.

Burl gulped and said sternly: "Where are the sharp things?"

The men looked at one another, numbly. Then one spoke despairingly, ignoring Burl's question. Now, said the man dully, there was not only the hunting-spider in the valley, but its young. And not only the young of the hunting-spider, but the young of a mantis. . . . It was hard to stay alive at the best of times. Now it had become impossible. . . .

Burl glared at him. It was neither courage nor resolution. He had come to realize what a splendid sensation it was to be admired by one's fellows. The more he was admired, the better. He was enraged that people thought to despair.

"I," said Burl haughtily, "am *not* going to stay here. I go to a place where there are neither spiders nor mantises. Come!"

He held out his hand to Sava. She gave the child to his mother and took his hand. Burl stalked haughtily away, and she went with him. He went uphill. Naturally. He knew there were spiders and mantises in the valley. So many that to stay there was to die. So he went away from where they were.

Burl had found out that adulation was enjoyable and authority delectable. He had found that it was pleasant to be a dictator. And then he had been disregarded. So he marched furiously away from his folk, in exactly the fashion of a spoiled child refusing to play any longer. He happened to march up the mountain-side toward the cloud-bank that he considered the sky. He had no conscious intent to climb the mountain. He did not intend to lead the others. He meant to sulk, by punishing them through the removal of his own admirable person from their society. But they followed him.

So he led his people upward. It has happened on other planets, in other manners. Most human achievements come about through the daring of those who strive.

THE SUN WAS VERY NEAR. It shone upon the top of the cloud-bank, and the clouds glowed with a marvelous whiteness. It shone upon the mountain-peaks where they penetrated the clouds, and the peaks were warmed, and there was no snow anywhere despite the height. There were winds here where the sun shone. The sky was very blue. At the edge of the plateau where the cloud-bank lay below, the mountainsides seemed to descend into a sea of milk. Great undulations in the mist had the seeming of waves, which moved with great deliberation toward the shores. They seemed sometimes to break against the mountain-wall where it was cliff-like, and sometimes they seemed to flow up gentler inclinations like water flowing up a beach.

All this was in the slowest of slow motion, because the cloud-waves were sometimes miles from crest to crest.

The look of things was different on the plateau, too. This part of the unnamed world, no less than the lowlands, had been seeded with life on two separate occasions. Once with bacteria and moulds and helens to break up the rocks and make soil of them, and once with seeds and insect-eggs and such living things as might sustain themselves immediately upon hatching. But here on the heights the conditions were drastically unlike the lowland tropic moisture. Different things had thriven, and in quite different fashion.

Here moulds and yeasts and rusts were stunted by the sunlight. Grasses and weeds and trees survived, instead. This was an ideal environment for plants that needed sunlight to form chlorophyll, and chlorophyll to make use of the soil that had been formed. So here was vegetation that was nearly Earth-like. And there was a remarkable side-effect on the fauna which had been introduced at the same time and in the same manner as down below. In coolness which amounted to a temperate climate there could be no such frenzy of life as formed the nightmare-jungles in the lowlands. Plants grew at a slower tempo than fungi, and less luxuriantly. There was no adequate food-supply for largest-sized plant-eaters. Insects which were to survive in sunshine could not grow to be monsters. Moreover, the night were chill. Many insects grow torpid in the cool of a temperate-zone night, but warm up to activity soon after sunrise. But a large creature, made torpid by cold, will not revive so quickly. If large enough, it will not become fully active until close to dusk. On the plateau, the lowland monsters would starve in any case. But—more—they would have only a fraction of a day of full activity.

There was a necessary limit, then, to the size of the insects that lived above the clouds. The life on the plateau would not have seemed horrifying at all to humans living on other planets. Save for the absence of birds to sing and lack of a variety of small mammals, the untouched, sunlit plateau with its warm days and briskly chill nights would have impressed most men as an ideal habitation.

But Burl and his companions were hardly prepared to see it that way at first glimpse. Certainly if told about it beforehand, they would have viewed it with despair.

But they did not know beforehand. They toiled upward, their leader moved by such ridiculous motives as have sometimes caused men to achieve greatness throughout all history. Back on Earth, two great continents were discovered by a man trying to get spires to conceal the gamey flavor of half-poiled meat. The power that drives mile-long space-craft, and that fights and runs the cities of the galaxy, was first developed because it could be used in bombs to kill other men. There were precedents for Burl leading his fellows into sunshine, merely because he was angered that they ceased to admire him.

The trudging, climbing folk were high above the valley, now. The thin mist that was never absent anywhere had hidden their former home, little by little. They climbed a steeply slanting mountain-flank. The stone was mostly covered by ragged, bluish-green rock-tripe in partly overlapping sheets. Such stuff is always close behind the bacteria which first attack a rock-face. On a slope, it clings while soil is washed downward as fast as it forms. The people never ate it. It produced frightening cramps. In time they would learn that if thoroughly dried it can be soaked to pliability again and cooked to a reasonable palat-

Nor had they ever known such surroundings as presently enveloped them. A slanting, stony mountainside which stretched up frighteningly to the very sky. Grayness overhead. Grayness, also, to one side—the side away from the mountain. And equal grayness below. The valley in which they lived could no longer be seen at all. Trudging and scrambling up the interminable incline, the people of Burl's personal following gradually realized the strangeness of their surroundings. As one result, they grew sick and dizzy. To them it seemed that the solid earth had tilted, and might presently tilt further. There was no horizon, but they had never seen a horizon. So they felt that what had been *down* was now partly *behind*, and they feared lest a turning universe let them fall ultimately toward the grayness they considered sky.

In this frightening strangeness, their only consolation was the company of their fellows. To stop would be to be abandoned in this place where all values were turned topsy-turvy. To go back—but none of them could imagine descending again to be devoured as one-third of their number already had been. If Burl had stopped, his followers would have squatted down and shivered together miserably, and waited for death. They had no thought of adventure nor any hope of safety. The only goodnesses they could imagine were food and the nearness of other humans. They clung together, obsessed by the dread of being left alone.

Burl's motivation was no longer noble. He had started uphill in a fit of sulks, and he was ashamed to stop.

They came to a place where the mountain-flank sank inward. There was a flat area, and behind it there was a winding cañon of sorts, like a vast crack in the mountain's substance. Burl breasted the curving edge, and walked on level ground. Then he stopped short.

The mouth of the cañon was perhaps fifty yards from the lip of the downward slope. There was this level space, and on it there were toadstools and milkweed, and there was food. It was a small, isolated asylum for life such as they were used to. It could have been that here they could have found safety. But it wasn't that way.

THEY SAW THE web at once. It was slung from between the opposite cliff-walls by cables two hundred feet long. Its radiating cables reached down to anchorages on stone. The snare-threads, winding out and out in that logarithmic spiral which men on other planets had noted thousands of years before—the snare-threads were a yard apart. The web was set for giant game. It was empty now, but Burl searched keenly and saw the tight-rope-cable leading from the very center of the web to a rocky shelf some fifty feet above the cañon's floor. At its end he saw the spider. It waited there, almost invisible against the stone, with one furry leg touching the cable that led to its waiting-place so that the slightest touch on any part of the web would warn it instantly.

Burl's followers accumulated behind him. They stared. They knew, of course, that a web-spider will not leave its snare under any normal circumstances. They were not afraid of that. But they looked at the ground between the web and themselves.

It was a charnel-house of murdered creatures. Half-inch-thick wing-cases of dead beetles. The cleaned-out carcasses of other giants. The ovipositor of an

dragged antennae of moths and butterflies.

Something very terrible lived in this small place. The mountainsides were barren of food for big flying things. Anything which did fly so high for any reason would never land on sloping, foodless stone. It would land here. And very obviously it would die. Because something—something—killed them as they came. It dived back in the cañon where they could not see. It dined here.

The humans looked and shivered. All but Burl. He deliberately chose for himself a magnificent lance grown by one dead creature for its own defense. He pulled it out of the ground and cleaned it with his hands. He seemed absorbed, but he was terribly aware of the inner depths of the cañon. He was actually pretending, for the sake of what he believed his dignity.

Fearfully, the other humans imitated him in choosing weapons from the armory of the devoured. Then Burl stalked grandly to one side and began to climb again. His people followed him in numbed silence. They were filled with dread, but it was not quite terror. Insects do not stalk their prey. The deadly unseen monster of the cañon had not attacked them. Therefore it did not know they were there. And therefore they were safe from it until it appeared. But none of them desired to stay.

The slope lessened, here, and half a mile further on there was a small thicket of mushrooms. From within it came the cheerful loud clicking of some small beetle, arrived at this spot nobody could possibly know how, but happily ensconced in a twenty-yard patch of jungle above a hollow that had gathered soil through the centuries. There were edible mushrooms in the thicket.

The humans ate. Naturally. And here they realized that they were no longer doomed by the creatures in the valley. Since their climb began they had seen no dangerous thing except the one gigantic, motionless web-spider. They had left the valley and its particular dangers behind.

A man exclaimed in naïve astonishment. He was eating raw mushroom at the moment, and his mouth was full. But abruptly it occurred to him that their doom was lifted. He mentioned the fact in a sort of startled wonder.

"We will stay here," he added happily. "There is food."

And Burl regarded him with knitted brows. Burl was well on the way to becoming spoiled. He had tasted power over his folk, and he found himself jealous of any decision by anybody else.

"I go on," he said haughtily. "Now! You may stay behind if you wish—alone!"

He broke off food for the journey. He held out his hand to Saya. He went on. And again he went upward because to go back was to go to the cañon of the unknown killer. And his folk docilely followed him. They did not really reason about it. To follow him had become a pattern, more or less precarious. In time it could become a habit. Over a period of years it could even become a tradition.

The procession marched on and up. Burl noticed that the air seemed clearer, here. It was not the misty, quasi-transparent stuff of the valley. He could see for miles to right and left, and the curvatures of the mountain-face. But he could not see the valley.

Then he realized that the cloud-bank he saw was finite—an object. He had never thought of it specifically before. To him it had seemed simply the sky.

definitely hid the height toward which he moved. He and his followers were less than a thousand feet below it. It appeared to Burl that presently he would run into an obstacle that would simply keep him from going any further. But until that happened he obstinately continued to climb.

The thing which was the sky appeared to stir. It moved. A little higher, and he could see that there were parts of it which were lower than he was. They moved also. But they did not approach him. And he had no experience of anything inimical which did not plunge upon its victims. Therefore he was not afraid.

In fact, a little later he observed that the whiteness retreated before him, and he was pleased. Weak things such as humans fled aside when predators approached. Here was something which fled aside at his approach. His followers undoubtedly observed the same phenomenon. He had killed a spider. He was a remarkable person. This unknown white stuff was afraid of him.

Burl, with bland conceit, marched confidently through the cloud-bank, ever climbing. At its thickest, he could see only feet in each direction, but always when he advanced threateningly upon opacity, it cleared before him.

Presently the gray light grew brighter. Burl and his folk were accustomed to a shadowless illumination such as fungi could endure—the equivalent of a heavily overcast day on an Earth-type planet. Now the mist about him took on a luminosity which was of a different kind. Suddenly he noticed the silence. He had never known even comparative silence before in all his life. His ears had been assailed every minute since he had been born by a din which was the noise of creatures. By stridulations, by chirpings, by screams, or at the least by the clicking of armor or the deep-toned pulsations of wings. He had always lived in the uproar of frenzied struggle. Now, that hellish chorus of shrieks and cries and mating-calls was cut off. The lower surface of the cloud-bank reflected it. Burl and his people moved upward through an unparalleled stillness.

They fell silent, marveling. They heard each other's movements. They could hear each other's voices. But they moved in a vast quietness over stones which here were not even lichen-covered, but glistened with wet. And all about them a golden glow hung in the very air. Stillness, and quietude, and golden light which grew stronger and stronger and stronger. . . .

It was very remarkable when they came up through the sea of mist upon a shore of sunshine, and saw blue sky and sunlight for the first time. The light smote upon their pink skins and brilliantly colored furry garments. It glistened in changing, ever-more-colorful flashes upon the cloaks made of butterfly wings. It sparkled upon the great lance carried by Burl in the lead, and the quite preposterous weapons borne by his followers.

The little party of twenty humans waded ashore through the last of the thinning white stuff which was cloud. They gazed about them with blinking, wondering, astounded eyes. The sky was blue. There was green grass. And there was sound. The sound was of wind blowing in the trees and sunshine.

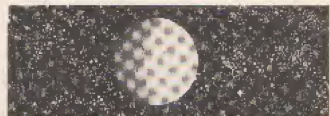
They heard insects, too, but they did not know what it was they heard. The shrill, small musical whirrings, the high-pitched small cries which made up a strange new elfin melody, were totally strange. All things were novel to their eyes, and an enormous exultation filled them. From deep-buried ancestral

was somehow normal. And they breathed clean air for the first time in many generations.

Burl even shouted, in triumph, and his voice rang echoing among rocks.

The plateau rang with the shouting of a man in triumph!

THEY HAD ENOUGH FOOD for days. They had brought it from the isolated thicket not too far beneath the clouds. Had they found other food immediately, they would have settled down comfortably, in the fashion normal to creatures whose idea of bliss is a secure hiding-place and food on hand. Somehow they believed that this high place was secure. But it was not a hiding-place. And though they did accept, with the simplicity of children and savages, that they had no enemies here, their first quest, nevertheless, was for a place in which they could conceal themselves.



They found a cave. It was small to hold all of them, so that they would be crowded in it, but, as it turned out, that was fortunate.

At some time it had been occupied by some other creature, but the dirt which floored it had settled flat and there were no recent tracks. It retained faint traces of an odor which was unfamiliar but not unpleasant. It had no connotation of danger.

Ants stank of formic acid plus the musky odor of their particular city and kind. One could tell not only the kind of ant but what hill they came from, from a mere sniff at a well-traveled ant-trail. Spiders had their own hair-raising odor. The smell of a praying-mantis was acrid, and of beetles decay, and of course those bugs whose main defense was smell gave off an effluvium which tended to strangle all but themselves.

The cave's smell was quite different. The humans thought vaguely that it might be another kind of man. Actually, it was the smell of a warm-blooded animal. But Burl and his fellows knew of no warm-blooded creatures but themselves.

They had come above the clouds a bare two hours before sunset—of which they knew nothing. For an hour they marveled, staying close together. They were astounded by the sun, more particularly since they could not look at it. But presently, being savages, they accepted it with the matter-of-factness of children.

They could not cease to wonder at the vegetation about them. They were accustomed only to gigantic fungi, and a few feverishly growing plants striving to flower and bear seed before being devoured. Here they saw many plants, and at first no insects at all. However, they looked only for the large things they were accustomed to.

They were astounded by the slenderness of the plants. Grass fascinated them, and weeds. A large part of their courage came from the absence of debris upon the ground. In the valley, the habitation of a trapdoor spider was marked by grisly trophies—armor emptied of all meat but not yet rotting by the highly specialized bacteria which flourished upon chitin. The hunting-ground of even a mantis was marked by discarded, transparent beetle-wings and

sharp spiny bits of armor, and mandibles not tasty enough to be consumed. Here, in the first hour of their exploration, they saw no sign that any insect from the lowlands had ever come to this place at all. But they interpreted the fact quite correctly as rarity, rather than complete absence of huge creatures blundering up into the sunlight.

They were relieved that they had found a cave. There was no thicket of trees close-growing enough to shelter them. They were ludicrously amazed when they found that trees were hard and solid, because the fungi they knew were easily cut by saw-toothed tools. They found nothing to eat, but they were not yet hungry. They did not worry about it while they still had bits of edible mushroom from their climb.

When the sun sank low and the crimson colorings filled the western horizon, they shivered. They watched the glory of their first sunset with scared, incredulous eyes. Yellows and reds and purples reared toward the zenith. It became possible to look and gaze directly at the sun. They saw it descend behind something they could not guess at. Then there was dark.

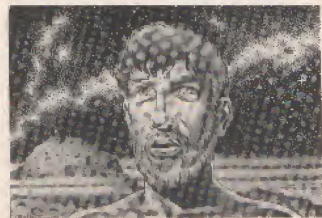
The fact stunned them. So night came like this!

Then they saw the stars as they winked singly into being. And the folk from the lowland crowded frantically into the cave with its faint odor of having once been occupied. They filled the cave tightly. But Burl was somewhat reluctant to admit his fear, and Saya lingered close to him. They were the last to enter.

NOTHING HAPPENED. Nothing. The sounds of evening continued. They were strange but infinitely soothing and somehow what night-sounds ought to be. Burl and the others could not possibly analyze it, but for the first time in many generations they were in an environment really similar to that intended for their race. It had a rightness and a goodness about it which was perceptible for all its novelty. And because Burl had once been lost from his tribe, he was capable of estimating novelties a little better than the rest.

He listened to the night-noises from close by the cave's small entrance. He heard the breathing of his tribesmen. He felt the heat of their bodies, keeping the crowded enclosure warm enough for all. Saya was close beside him. She held fast to his arm for reassurance. He was wakeful, and thinking very busily and very painfully.

Saya was filled with a tumult that was combined fear of the unknown and relief from much greater fear of the familiar . . . and warm, proud memories of the sight of Burl leading and commanding the others, and memories of the look and feel of sunshine, and



... he was the first man in . . . forty generations to look at them."

pictures of sky and grass and trees which she had never seen before. Emotion-filled memories of Burl as he killed a spider! Flinging a ball-fungus at a hatching mantis, saving a young boy. Grandly leading the others up the mountainside which it had never occurred to anybody else to climb. Keeping onward sternly when it seemed that the solid ground had twisted and would drop them into a misplaced sky. And now, between her and the doorway to the strange and very beautiful night outside.

Saya felt an absorbed, impassioned, delectable disquiet from the touch of Burl's arm beneath her fingers.

He stirred. She whispered a question.

"I am going out," he murmured in her ear. "I wish to see the lights. To see if they come nearer, or move."

It had occurred to him that the first few stars they had seen glowed in darkness like the giant fireflies of the valley. They were comparable in size to all the enlarged insect kingdom. They were a yard and more in length, and sometimes at night they soared and wheeled above the lowland fungus jungles, and the segmented larval females of their kind, which never grew wings, grew frantic at the sight. They climbed recklessly upon the flat tops of toadstools and waved their dinner twined lanterns at the flying males.

But this was not the lowland. Burl freed his arm from Saya's fingers. He crept through the constricted opening of the cave, carrying his lance before him. He already had a vague idea that it should be not only an instrument but a weapon. He imagined stabbing enemy creatures with it—but only vaguely, as yet.

He stood upright in the open air. There was coolness. Night had fallen, but only a little while since. There were smells in the air such as Burl had never smelled before—green things growing, and the peculiar clean odor of wind that has been bathed in sunshine, and the peculiarly satisfying fragrance of coniferous trees.

But Burl raised his eyes to the heavens. He saw the stars in all their glory, and he was the first man in at least forty generations to look at them from this planet. There were myriads upon myriads of them, varying in brightness from stabbing lights to infinitesimal twinklings. They were of every possible color. They hung in the sky above him, immobile and unthreatening. They had not come nearer. They were very beautiful.

Burl stared. And then he noticed that he was breathing deeply, with a new zest. He was filling his lungs with clean, cool, fragrant air such as men were intended to breathe from the beginning, and of which Burl and many others had been deprived. It was almost intoxicating to feel so splendidly alive and unafraid.

There was a rustling. Saya stood beside him, trembling a little. To leave the others had required great courage. But she had come to realize that if any danger befell Burl she wished to share it. So she had come. They shared the starlight.

They heard the nightwind and the orchestra of night-singers. They wandered aside from the cave-mouth, and Saya found completely primitive and wholly atavistic pride in the courage of Burl, who was actually not afraid of the dark! Her own uneasiness became merely something to give more savor to her pride in him. She stayed close beside him, not only for reassurance but also for joy in being close to him.

Presently they heard a new sound in the night. It

was very far away and not in the least like any sound they had ever heard before. It changed in pitch. Insect-cries do not. It was a baying, yelping sound. It rose in pitch, and held the higher note, and abruptly dropped in pitch before it ceased. Minutes later it came again.

Saya shivered, but Burl said thoughtfully:

"That is a good sound."

He didn't know why. Saya shivered once more. She said reluctantly:

"I am cold."

It had been a rare sensation in the lowlands. It came only after one of the infrequent thunderstorms, when wetted human bodies were exposed to the gusty winds that otherwise rarely blew there. But here the nights grew cold, after sundown. The heat in the ground radiated to outer space at night, not being trapped by a layer of clouds. Before dawn, the temperature would be close to freezing, though anything worse than a light fleeting hoar-frost would be rare on this plateau.

The two of them went back to the cave. It was warm there. The cave was so packed with humans that their body-heat kept the air from growing chill. Burl and Saya crouched among the rest, and became drowsy and comfortable. Presently Saya dropped off to sleep, her hand trustfully in Burl's.

But he remained awake for a long time, blinking. He thought of the stars, but they were too strange. He thought of the trees and grass. But most of the impressions of this upper world were so remote from previous knowledge that he could only accept them as they were and defer reflection upon them until later. But he did feel an enormous complacency, what with having brought his followers to an effective paradise of safety, and having arrived at a completely satisfactory emotional status with Saya.

But the last thing he actually thought about, before his eyes blinked shut in sleep, was that yelping noise he had heard in the night. It was totally novel in kind, yet there was something buried among his racial heritages that told him it was good.

BURL WAS FIRST awake of all the tribesmen and he looked out into a cold and pallid grayness. He saw trees. One side of the cluster was brightly lighted, the other side was dark. He heard tiny singing noises of the creatures of this place. Presently he crawled out of the cave to scout for danger.

The air was biting in its chill. It was an excellent reason why giant insects could not survive here, but it was particularly invigorating as he breathed it in. Then he summoned courage to move to where he could peer at the source of this strange light.

He saw the top of the sun as it peered above the eastern cloud-bank. The sky grew lighter. He blinked at the sun and saw it rise more fully into view. He thought to look upward, and the stars that had bewildered him were nearly gone.

He ran to call Saya.

The rest of the tribe waked as he roused her. One by one they followed, to watch their first sunrise. The men and women gaped at the sun as it filled the east with colorings and rose above the seemingly steaming layer of clouds and then appeared to spring free of the horizon and swim on upward.

The children blinked and shivered and crept to their mothers for warmth. The women enclosed them in their cloaks, and they thawed and peered out once more at the glory of sunshine and the day. Soon, though, they realized that warmth came from the

glaring body in the sky. The children presently discovered a game. It was the first game they had ever played, and it consisted simply of running into a shaded place until they shivered, and then of running out into the sunshine again where they were warm. Until this dawning they had never been free enough from fear to play at all. But this discovery of the nightly chill and of the utility of cloaks for warmth up here as well as it had been against the nightly rain of the lowlands, was a specific suggestion of the value of clothing. Which was to have another significance, a short time later.

In this first dawn of their experience, the tribesmen ate of the edible mushroom they had brought up the mountain-flank. But there was not an indefinite amount of food left. Burl shared the meal Saya brought him. She touched him fondly. But he regarded his happy fellows with something like a scowl. They were quite contented, and they had for the moment no need of his guidance. They did not look to him for orders. And Burl wanted attention.

He spoke abruptly.

"We do not want to go back to the place we came from," he said sternly. "We must look for food here, so we can stay for always. Today we look for food."

It was a seizure of the initiative. It was the linking of what the folk most craved with obedience to Burl. It was the instinct of a leader. The eating men murmured agreement. There was a certain definite idea of goodness—not moral virtue, but of the desirable—becoming associated with what Burl did and what Burl commanded. His tribe was becoming a group of which he was the leader, rather than only a loose association held together only by the fear of solitude.

He led them exploring as soon as they had eaten. All of them, of course. None had yet become confident enough to be left behind. They straggled irregularly behind Burl and Saya. They came to a brook and regarded it with amazement. There were no leeches. No fungus. No swiftly drifting islands of scum. It was clear. Greatly daring, Burl tasted it and it was water, but such as he had never tasted before. It was clean, fresh, sparkling water, not fouled by drainage through mould or rust.

The rest of the tribe tasted. A child slipped on a muddy place and sat down hard on white stuff that yielded and almost splashed. The child howled. Saya picked it up. Then she looked where it had been for spines or small stinging things.

She stared blankly.

She went to Burl with a tiny white thing in her hand. It was a mushroom. But it was a tiny, clean, appetizing object. Saya had no words for it. She was amazed.

Burl smelled it carefully. He tasted it. And it was actually no more and no less than a normal mushroom, growing in a shaded place upon enormously rich soil. It had been protected from sunlight, but it had not the means nor the stimulus to become a monster.

Burl ate it. He carefully composed his features. Then he announced the find to his followers.

There was food here, he told them. But in this splendid world to which he had led them, food was small. There would be no great enemies here, but the food would have to be sought in small objects rather than great ones. They must look at this place and seek others like it, where food would be found...

The tribesmen were doubtful. But they plucked mushrooms—whole ones!—instead of merely breaking off parts of their tops. In deep astonishment they recognized miniatures of what they had known only

in gigantic forms. They tasted. The tiny mushrooms had the same savor, but they were not coarse or stringy or tough like the giants. They melted in the mouth! Life in this place to which Burl had led them was delectable! Truly the doings of Burl were astonishing!

When a child found a beetle on a leaf, and they recognized it, they were entranced, for instead of being bigger than a man and a thing to flee from, it was less than an inch in size and helpless against them. From that moment on, they would follow Burl anywhere and obey him in any matter, in the happy conviction that he could do nothing that was not desirable in all respects.

The belief, of course, was not quite accurate. Tender tiny mushrooms as a staple. Instead of the tough and chewy provender they were used to, in time would cause them to have toothaches. But they could not anticipate it, and it was actually very far away in time.

They struggled after Burl through vast patches of bushes with thorns on them. They were not used to thorns, and they deeply distrusted the bushes and even the glistening fruit on them, which eventually they would know were blackberries. Near midday they heard noises in the distance.

The sounds were made up of cries of varying pitch, some of which were sharp and abrupt, and others longer and less loud. The people did not understand them in the least. They could have been the cries of human beings, but they were assuredly not cries of pain. Also they were not language. They seemed to convey an impression of enormous, zestful excitement. They had no overtone of horror. And Burl and his folk had known of no excitement among insects except the frenzy of ferocity. They were unable to imagine even the nature of the tumult.

To Burl the cries seemed to have somewhat the timbre of the yelping sounds he had heard the night before. And he had felt instinctively drawn to that sound. He liked it.

He led the way boldly in the direction of the noise. And presently he came out of breast-high weeds with Saya close behind him and the others trailing. He emerged upon a space of bare stone, a little upraised. He looked down into a small and grassy amphitheater. The tumult came from its center.

A pack of dogs were joyously attacking something that Burl could not see clearly. They *were* dogs. They harked zestfully, and they yelped and snarled and yapped in a dozen different voices, and they darted at the unseen something and darted away, and they were having a thoroughly enjoyable time, though it might not be so good for the thing they attacked.

One of them saw the humans and stopped stock-still and harked. The others whirled and saw the humans as they came out into view. The tumult ceased entirely.

There was silence. The men for the first time saw creatures with only four legs. They had never before seen any moving thing with fewer than six—except men. Spiders had eight. The dogs did not have mandibles. They did not act like insects.

And the dogs saw men, whom they had never seen before. Much more important, they smelled men. And the difference between man-smell and that of insects was vast. Through many generations the dogs had not smelled anything with warm blood save their own kind. The difference in smell between insect and man was so great that the dogs did not react with suspicion, but with curiosity. This was an unparalleled smell. It was even a good smell.

The dogs regarded the men with their heads on one side, sniffing them in the deepest possible amazement—amazement so intense that they could not feel hostility. One of them whined a little because he did not understand.

PECULIARLY ENOUGH, it was a matter of topography. The plateau which reached above the clouds rose with a steep slope from the valley in which Burl and the others had lived. To westward, however, the highland was subject to an indentation which almost severed it. No more than twenty miles from where Burl's group had climbed to sunshine, there was a much more gradual slope downward. There, mushroom-forests grew almost to the cloud-layer. From there, giant insects strayed up and onto the plateau itself. They could not live on the plateau, of course. There was no food for their insatiable hunger. Especially at night, there was no warmth to keep them active. But they did stray from their normal environment, and some of them reached the sunshine, and perhaps some of them blundered back down to their mushroom-forests again. But those that did not find their way back were chilled to torpor during their first night on the highland. They were only partly active on the second day—if, indeed, they were active at all. And few or none recovered from the second night of cold. Certainly none kept their full ferocity and deadliness. And this was how the dogs survived.

Unquestionably the dogs were descended from dogs on the wrecked ship—name now unknown—which had landed on this planet some forty-odd human generations since. The humans had no memories of that ship, and the dogs had surely no traditions. But perhaps because those early dogs had less of intellect, they had possessed more useful instincts. Perhaps dogs were bred by the first desperate generations of humans, to warn them against dangers. But no human civilization could survive the environment of the lowlands. The humans inevitably reverted to the primitive. The environment was not one in which dogs could survive, so somehow they took to the heights. Perhaps dogs survived their masters. Perhaps some were abandoned or driven away. But dogs had reached the heights. And they did survive because of the simple fact that giant insects blundered up after them—and could not survive the proper environment for dogs and men.

There was even a reason why they had not multiplied excessively. The food-supply was limited. When there were too many dogs, their attacks on stumbling insects were more desperate, and made earlier before ferocity of the insects was lessened. And more dogs died. So there was a specific adjustment of the dog population to the food-supply. There was also a selection of those intelligent enough not to attack foolishly, but not of those whose cowardice left them out of conflict altogether.

These dogs who regarded men with their heads cocked on one side were excellent dogs. Intelligent dogs. They did not attack anything imprudently, and they knew it was not necessary to be more than wary of insects in general. Even spiders, unless they were very newly arrived from the lowlands. So the attitude of men and dogs was that of astonished curiosity rather than that of instant fear or rage. Burl knew that the shaggy, bright-eyed creatures were unlike insects. Actually, they behaved strikingly like men. They were estimating these strange beings, men. Insects never estimated. Those that were not carnivorous had no interest in anything but food, and those

that were carnivorous lumbered insanely into battle the instant any prey came to their notice. The dogs did neither. They sniffed. They considered. They were amazed.

Burl said harshly to his group:
"Stay here!"

He walked slowly down into the amphitheater. Saya, disregarding his order, followed him instantly. The dogs moved warily aside. But they raised their noses and sniffed—long, luxurious sniffs. The smell of humankind was a good smell. Dogs had gone hundreds of generations without having it in their nostrils. But before that there were thousands of generations of dogs to whom that smell was a fulfillment.

Burl reached the object the dogs had been attacking. It lay on the grass, throbbing painfully. It had come up from the world below. It was the larva of an azure-blue moth which spread ten-foot wings at night-fall. The time for its metamorphosis was near, and it had gone blindly in search of a place where it could spin its cocoon safely and change to its winged form. It had come to another world—the world above the clouds. It could find no proper place. Its stores of fat had protected it a little from the chill. But the dogs had found it.

Burl considered. It was the custom of wasps to sting creatures like this within a certain special spot—marked for them apparently by a tuft of dark fur.

Burl thrust his lance into that particular spot. The creature died quickly and without agony. The thought to kill was an inspiration, which was the result of continued adventuring. Burl cut off meat for his tribesmen. The dogs offered no objection. They were well-fed enough. Burl and Saya, together, carried the meat back to the blinking tribesfolk. On the way they passed within two yards of a dog which regarded them with extreme intent and almost a wistful expression. Their smell did not mean game. It meant—something the dog struggled dumbly to remember.

"I have killed the thing," said Burl, in the tone of one speaking to an equal. "You can go and eat it now. I took only part of it."

The dog wagged its tail—and then backed away as if in confusion. After all, matters had not yet progressed to cordiality.

The humans consumed what Burl had brought them. Most of the dogs went to the feast Burl had left. Presently they were back. They had no reason to be hostile. They were fed. The humans offered them no injury. The humans smelled good. The dogs were fascinated by their smell.

Presently they were close about the humans. They were not insects. They were interested. The humans were extremely interested in anything which was interested in them. It was a wholly novel experience. It was the feeling Burl had felt in becoming the tribal leader. Now every human felt a little of it, in the intent regard of the dogs. And everything else was so strange that it was possible to accept anything without question. Even the possible friendliness of unparalleled creatures which assuredly were not of a kind with past enemies.

A similar state of "mind" existed among the dogs. Saya had more meat than she desired. She looked about among the humans. All were well supplied. She tossed it to a dog. He jerked away alertly, and then sniffed at the meat where it had dropped. A dog can always eat. He ate it.

"I wish you would talk to us," said Saya hopefully.

The dog wagged his tail.

"You do not look like us," said Saya interestedly, "but you act as we do. Not as the—monsters!"

The dog looked at meat in Burl's hand. Burl tossed it. The dog caught it with a quick snap, swallowed it, wagged his tail briefly and came closer. It was a completely incredible action, but dogs and men were blood-kin on this planet. Besides, there was subconscious racial-memory instinct in friendship between man and dog. It was not overlaid by any past experience of either. They were the only warm-blooded creatures on this world. It was kinship felt by both.

Burl stood up and spoke politely to the dog. He addressed him with the same respect he would have given to another man. In all his life he had never felt equal to an insect, but he felt no arrogance toward this dog.

He felt superior only to other men.



"We are going back to our cave," he said politely. "Maybe we will meet again."

He led his tribe back to the cave in which they had spent the previous night. The dogs followed, ranging on either side. They were well-fed, with no memory of hostility to any creature which smelled like men. They had instinct and intelligence. The latter part of the return to the cave—if anybody had been qualified to notice—was remarkably like a group of dogs taking a walk with a group of people. It was companionable. It felt remarkably right.

That night Burl left the cave, as before, to look at the stars. This time Saya went with him, gladly. But as they emerged from the cave-entrance there was a stirring. A dog rose and stretched itself elaborately, yawning the while. When Burl and Saya walked aside from the cave, the dog trotted amiably with them.

They talked to it, embarrassed. And the dog seemed pleased. It wagged its tail.

When morning came the dogs were still waiting hopefully for the humans to come out. They appeared to expect the humans to take another nice long walk, on which they would accompany them. It was a brand-new satisfaction they did not wish to miss. After all, from a dog's standpoint, humans were made to take long walks with, among other things. The dogs greeted the humans with tail-wagging and cordiality.

THE FRIENDSHIP of the dogs assured the humans' new status in life. They had ceased to be fugitive game for any insect murderer. They had hoped to be unpursued foragers. But, joined to the dogs, they were raised to the estate of hunters. The men did not domesticate the dogs. They made friends with them. The dogs did not subjugate themselves to the men. They joined them, at first tentatively and then with worshipful enthusiasm. And the partnership was so inherently right that within a month it was as if it had been always. And indeed, except for a few centuries, for them, it had.

The humans had made a permanent encampment by then. There were a few caves at an appropriate distance from the slope up which most wanderers from the lowlands came. The humans moved into the caves. A child found the chrysalis of a giant butterfly, whose caterpillar form had so offensive an odor that the dogs had not attacked it. But when it

emerged from the chrysalis, humans and dogs together assailed it before it could take flight. They ended with warm approval of each other. The humans had great wings with which to make cloaks. And men wore cloaks now—shorter than the women's—but cloaks. They were very useful against the evening chill. When one dawning a vast outcry of dogs awoke the humans, Burl led the rush to the spot, and his great lance did execution which the dogs appeared to admire. Burl wore a moth's feathery antennae, now, bound to his forehead like a knight's plumes. They were very splendid.

In a single month their entire way of life went through a revolution. The ground was often thorny. A man pierced his foot, and bandaged it with a strip of wing-fabric so he could walk. The injured foot was more comfortable to walk with than the well one. Within a week women were busily contriving divers forms of footgear, to achieve the greatest comfort. One day Sava admired glistening red berries and tried to pluck them, and they stained her fingers. She licked the fingers—and berries were added to the tribe's menu. A veritable orgy of experimentation began. And this was a state of affairs which is very, very rare among human beings. A tribe with an established culture and tradition cannot change without disaster. But men who have abandoned their old ways and are seeking new ones can go far.

Already the dogs were established as sentries and watchmen and friends to every one of the humans. By now mothers did not feel alarmed if a child wandered out of sight. There would be dogs along. No danger could approach a child without vociferous warning from the dogs. Men went hunting, now, with zealous tail-wagging dogs as companions in the chase. By the time a stray monster from the lowlands reached this area, it was dazed and half-numbed by at least one night of bitter cold. Even spiders could not find energy to leap. They fought like fiends, but sluggishly. Men could kill them while dogs kept their

attention. Burl killed one the third week on the plateau. He was nervous to the deed by a peculiar feeling that he must be worthy of the courage of the dogs with him at the time.

And presently, while their way of life was still fluid, the permanent pattern of civilization on the nightmare planet was settled. Burl and Sava went out early one morning with the dogs, to hunt for meat for the village. Hunting was easiest in the morning while creatures strayed up the night before were still numbed. Often, hunting was merely butchery of an enfeebled monster to whom any sort of movement was enormous effort.

This morning the humans moved briskly. The dogs roamed exuberantly through the brush before them. They were five miles from the village when the dogs bayed game some distance ahead. And Burl and Sava ran to the spot hand in hand—which was something of a change from their former actions at the thought of a giant creature of the insect kind—and found the dogs dancing and barking around one of the most ferocious and most ghastly of the carnivorous beetles. It was not too large, to be sure. Its body might have been four feet long, but its horrid mandibles added three feet more.

Those scythe-like objects gaped wide—opening sidewise as a beetle's jaws do—and snapped hideously, swinging about as the dogs dashed at them. The legs were spurred and spiked and armed with dagger-like spines. Burl plunged into the fight.

The great gaping mandibles clicked and clashed. They were capable of disemboweling a man or snapping a dog's body in half without effort. There were whistling noises as the beetle breathed through its abdominal spiracles. It fought furiously, making frantic plunges at the dogs who dashed in and out to torment and bewilder it while they created the most zestfully excited of uproars.

There was something beside this conflict that Burl and Sava should have noticed, but they were in-



"Those scythe-like objects gaped wide . . . as the dogs dashed at them."

stantly intent. The other thing was quite unparalleled. There had been nothing else like it on this planet in many hundreds of years. It moved slowly above the plateau as if examining it. It was half a dozen miles away and perhaps a mile higher when Burl and Saya prepared to intervene professionally on behalf of the dogs. Then it swerved and moved directly toward them. It moved swiftly.

But it was silent, and they did not know at all. Burl leaped in with a lance-thrust at the tough integument where an armored leg joined the body. He missed, and the monster whirled. Then Saya flashed her cloak before the beetle, so that it seemed a larger and nearer antagonist. As the creature whirled again, Burl thrust once more and a hind-leg crumpled.

Instantly the thing limped crazily. A beetle does not use its legs like four-legged creatures. It moves the two end legs on one side with the center leg on the other, so that always it is braced on an adjustable tripod. But it cannot adjust readily to crippling.

A dog snatched at a spiny power leg and crunched and darted away. The expressionless, machine-like horror uttered a forlorn, deep-bass cry and was spurred to all possible ferocity. The fight became a thing of furious movement and uproar, with Burl striking once at a multiple eye so the pain would deflect it from a charge on Saya, and Saya again deflecting it with her cloak and once breathlessly trying to strike it with her shorter spear.

Then the beetle sank to the ground, all three legs on one side crippled. The remaining three thrust and thrust and struggled terribly and suddenly it was on its hark, still striking its gigantic jaws frantically in the hope of murder. But Burl stabbed home between two armor-plates where a ganglion was almost exposed. A thrust killed it instantly.

Burl and Saya smiled at each other. There was a monstrous sound of splintering trees. They whirled. The dogs pricked up their ears. One of them barked defiantly.

SOMETHING HUGE truly huge!—settled to the ground a bare hundred yards away. It was metal, and there were ports, and it was utterly beyond experience, because, of course, there had been no spaceship landings on this planet in forty-odd human generations. But as Burl and Saya stared blankly at it, a port opened, and men came out, and they waved hopefully to the two barbarically attired figures who had been seen fighting a monster with the help of dogs. Which meant some sort of civilization.

The dogs confirmed it. They sniffed. These, also, were men. And Burl and his tribe had this smell, and were friends. So the dogs trotted forward with the self-confident cordiality of dogs on excellent terms with men—and there was no question of friendship. None at all. The men came forward joyously to talk to Burl and Saya.

There were difficulties, of course. But Burl and Saya had the calm composure of savages, and the alertness of people who are changing the pattern of their lives of their own volition—and finding it very pleasant—and things went swimmingly. There was, on the spaceship, an "educator." They invited Burl to put it on his head. He obliged. And very shortly he understood a new language, and was equipped with a very considerable fund of general information. Among the items of information was the fact that presently he would have a splitting headache—he did—and that the making of records for an educator was so different that it required generations to get

all the facts and knowledge for a single type of education down in permanent form.

All of which fitted admirably into the arrangements that the men on the spaceship were anxious to make, and Burl was enthusiastically willing to accede to. He and his folk knew the creatures of the lowlands as nobody else could possibly know them. No electronic educator could possibly make a record making available that knowledge in less than two generations—maybe three. Therefore—

THE NIGHTMARE WORLD swims in space about its nearby sun. It has a name now, but it does not matter. It has a city on it, which probably matters less. It is a curious city, though. The people in it wear gorgeous colored fur, and cloaks of butterfly wing. The least of the people in that city wear garments which would fetch fortunes on other inhabited worlds. In fact, such garments do. But it is most practical for Burl and Saya, and their followers to wear such garments. There is no day but that a small, winged flying craft rises from the city to go silently over the plateau until it reaches the space above the cloud-hank, and then dives down into it. It is wise for the occupants and the operators of such small craft to wear garments like the other humans on this planet. They are recognized, that way, when garments such as most planets find suitable would make them seem strange.

They want to be recognized, in the jungles and the noisome valleys of the lowlands. There are other humans down there. The people of the city, of course, bring their fellows out as fast as they can find them. There is a session with an educator—and a splitting headache afterward—and very soon the folk who have hidden from monsters all their lives are zealously hunting them with dogs. Presently they are hunting them with flying machines.

It is a nice arrangement. The search for more people in the lowlands is a prosperous business, even when it is unsuccessful. The wings of white morph butterflies bring the highest price, but even a common swallow-tail is riches enough. And the fur of caterpillars—duly processed—goes into the holds of the regular spaceliners with the same care given elsewhere to jewels and platinum.

But the nightmare planet has not become a merely sordid place of business. What comforts and what luxuries spaceships can bring are available enough, to be sure. But the city on the plateau, and the homes of the barbarically clad inhabitants are not places to which invitations are coveted for the luxury of them. The planet is a sportsman's paradise.

Not long since, the Planet President of *Surmor III* was a guest in Burl's dwelling. Burl is all hard muscle, despite his graying hair, and he and Saya have fitted very beautifully into the sort of civilization that turned out to be congenial to them. They have grown children now, and their home is quite fit to entertain a World President in its richness. But it is small—the size they want it to be.

The atmosphere is oddly informal. There are self-respecting and amiable dogs nearly everywhere. The World President of *Surmor III* was inclined to be stand-offish at first. But he is a sportsman, like Burl. And since the last hunting trip, he is very respectful. After all, there are few planet leaders who will, as they do, for pure sporting joy of the hunt, fight the mastodon-sized tarantula of the lowlands with nothing but a spear—and win.

But Burl does.

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THE DIMENSIONAL TERROR

by HARRY WALTON

(Illustration by Paul Cooper)

HAD THE LETTER been sent to Einstein, or the Research Division of General Electric, or even the Atomic Energy Commission, it probably would have landed in the wastebasket. But magazine editors must treat readers' correspondence with respect—and even with care when, as in this case, the letter warns that a package follows.

Horace Prell read it twice, sighed a little, and turned to toss it into the "Form Reply" basket. He held his hand.

"Have we received a package from an Emmanuel Smith?" he asked his secretary.

Miss Dobbs made a small flurry through the day's mail.

"Nothing yet," she reported.

Prell slipped the letter into the "Hold" file. Experience had taught him that the package would eventually arrive, quite possibly bearing neither name nor return address. Moreover, the writer of this letter was precisely the kind to clamor lustily if the package—whatever its nature—went astray. In a crabbed, precise hand he had written:

Mr. Horace Prell, Editor
Scientific News Monthly
New York City
Dear Sir:

Encountering a description of the Klein bottle, which demonstrates certain aspects of topology, I made several for my own amusement. Like any thin glass vessel, they ring with a faint musical note when struck. I have discovered that when two bottles have the same fundamental note, a small object placed between them blurs and seems to disappear when the bottles are sounded. As the notes die away, the object reappears.

I am sending you these bottles, so that you may make the experiment yourself. Can there be a form of sound, or a harmonic extending into a fantastic fourth dimension, that nullifies light? What is your opinion?

Emmanuel Smith
Chicago, Ill.

There was no street address either on the letter or on the plain envelope.

"Crank," muttered Prell to himself, as one who had dealt with many of the breed and knew them well. For example, there was the well-dressed man who claimed to foretell the future by reading newspapers through a hole in a spoon...

Prell forgot the letter while blue-penciling copy about a gas-turbine locomotive. Then a reader's contribution, dealing with an electrical mouse that could find its way out of a maze, occupied him until five o'clock. An hour later, he reached his home.

"There's a package for you, Horace," said his wife Cora from the kitchen.

Roughly the size of a shoe box, it bore the name of Emmanuel Smith. But again no return address. Prell's home address, however, was correct. Since it

appeared nowhere in Scientific News Monthly, he wondered how Smith knew it. He also wondered why he sent the package here instead of to the office. Prell unwrapped it hastily, for curiosity is an occupational hazard among editors.

Crackpot or not, Emmanuel Smith had wrapped the contents well. There was a cardboard jacket inside the box, and within this, swathed in cotton wool, lay two grotesque little vessels of green glass. They were about five inches long. Their fanciful form was almost beautiful.

"Supper's on, Horace. Don't let the soup get cold."

Hastily he replaced the top layer of cotton wool. Cora was already seated at the table. As usual, they started the meal in silence. Prell wasn't as hungry as he had thought. He confessed to himself that the bottles intrigued him, if only because they were a geometric *tour de force*.

"Horace," Cora broke the silence as she brought out the meat loaf. "The last few nights I have been having the weirdest dreams. I haven't dreamed since I was a little girl. I don't know why I start now."

"It is strange," he answered. "What kinds of dreams?"

"I seem to be in a different world or universe. Everything is queer there. The air is thick. Objects are lighter than they should be. In fact, objects are made of space. It's all like a photographic negative. A world in reverse. Things are empty holes in solid space. The holes spin like whirlpools. Only, how can a hole spin?"

"Mathematically, I suppose it could," he considered. "But you surely didn't dream that! You must have read it somewhere. It sounds like a pretty sophisticated scientific idea."

"Maybe I did read it," she admitted dubiously. "I don't remember. It seemed very real. I even dream that I am wide awake, conscious. I dream that someone... some... thing makes me dream and tells me about this other strange world. A dream within a dream!"

"You'd better see Dr. Mendoza," said Prell. "He'll give you a sedative, or tonic, to help you sleep."

She stared at her food. "It's not really necessary. The dreams are really fascinating. They're almost like a story. The strange being in the dream explains that there is telepathy between us when I sleep. The subconscious takes over in sleep, doesn't it? He—the being—is very curious about us. He observes us and our world through my mind. Silly, isn't it?"

Watching her as she pecked at her plate, he wondered if she wished it were not silly. Perhaps she realized his suspicion, for her next words were mundane enough.

"Madge is having another baby. This will be their third."

Prell nodded noncommittally. He knew his wife blamed him for their childlessness, and he wasn't altogether certain she was wrong. He ate mechanically, in silence.

"You might say something," Cora remarked, finally.

"What do you want me to do, congratulate you?" he asked irritably.

Immediately he was sorry, but the damage was done. All too frequently he said the worst possible things to Cora, who was difficult about receiving apologies.

She stiffened for an instant. Then she looked down contemptuously, like a civilized woman in a slaughterhouse.

"I'm sorry, Cora. You know I didn't mean—"

"There is nothing to say, Horace. I try to be pleasant, but you turn our every-day life into a nightmare. Why did I ever marry you!"

It was a miserable meal, right through the coffee. Afterward, without a further word, she went to her room, while he retired to his den.

THIS WAS a shelf-lined retreat with one comfortable chair and a good reading light. Since Cora never touched the den, a pile of books lay on the lamp table. He picked up the top one, George Gamow's *One Two Three . . . Infinity*.

On page 62, a Klein bottle. A three-dimensional vessel with only one side, which returns on itself to form both inside and outside. A geometric freak, hinting by analogy of yet stranger things in other dimensions, other worlds.

Cora, with her hair in curls, and wearing a faded chenille robe, called from the hallway. "There is another package by the back door. It was in my way all day, and I wish you wouldn't send office things to the house."

He mumbled thanks as he climbed the stairs to bed. As he sat idly and meditated, something made him pick at the cotton wool in the shoe box. His fingers trembled a little.

Besides the bottles, there were two tiny wooden mallets and a pair of wire stands. A loop of narrow ribbon encircled the serpentine return neck of each bottle. By this loop it evidently was supposed to hang from one of the standards. He set up the standards and suspended the bottles. He struck one with a mallet.

The tone was disappointing, a mere *plink* of sound. The second bottle sounded exactly the same. He struck both bottles at once.

Though only a little louder, the combined tone acquired an entirely new quality—something beyond

depth and timber. Its vibration instantly intrigued Prell. Was there a strange acoustical effect here, quite apart from Smith's absurd notion that it nullified light? A new sense beyond that of the ear?

Curiosity had made sound, at one time, a brief obsession of Prell's. He had spent many hours with a tape recorder, a high-fidelity electronic amplifier, and even a small audio oscilloscope. Deliberately he replaced bottles and mallets in the box and went downstairs into the cellar.

Here was his workbench with a Bunsen burner, some flasks containing the flaking remains of forgotten solutions (for he was not a tidy man), and miscellaneous old dry cells and small hand tools. He cleared enough room for the bottles and their standards. From under the bench he drew the oscilloscope.

The pulse in his ear always beat audibly when he grew excited. It was pounding away now. He was always skeptical of claims and unproved facts when he poised a blue pencil over a manuscript, but at this moment he was uncritically eager, like a small boy with a new chemistry set. He switched on the oscilloscope and impatiently waited. It warmed slowly.

At the *plink* of a single bottle a slender quivering line blossomed on the tube face. Prell could have calculated its frequency, but he was too excited. His pulse thumped as he poised the two hammers. He struck. The crest of the wave forked. The vibrations were out of phase. Studiously co-ordinating his muscles, he smote the bottles again.

The crests on the tube face leaped momentarily. And, as again his ears plumbed the hidden depths of the combined tones, the oscilloscope line flattened!

Soon the note died; he struck a single bottle again. The green line leaped in response. Again to both bottles, struck simultaneously, it reacted only for a split second. There was, then, something strange about the

In the earlier days of science-fiction, the concept of a physical fourth-dimensional world was a standard gambit of the genre. With the more general acceptance in recent years, of Albert Einstein's presentation of time as the actual fourth dimension, this phase of science-fiction is now seldom seen. Yet we know that there are sounds transmitted at frequencies which the human ear cannot detect; that energy impulses travel all about us, unseen by human eyes. Why is it necessarily impossible that there might be coexisting about us either in hyper-space or in an intangible state, an entirely different world unsuspected by us? Such a concept serves as the setting for this very disquieting science-fiction story.



bottles. It was possible, he knew, to obtain from two tones a beat frequency unlike either of them. But why did the oscilloscope not show it? There was no doubt that he heard it. If it had not been for the unlucky flare-up at supper, he would ask Cora to confirm what he heard with his own ears, but he knew she would refuse to be helpful. Besides, he certainly *did* hear it.

Possibly the microphone was defective in the range of that particular tone. There must be a simple explanation. He shouldn't make too much of the phenomenon, but what was Emmanuel Smith's strange delusion? Were these effects tricks of the senses?

He pushed a small can of glue between the bottles. Then he carefully struck them together. The oscilloscope trace leaped and flattened. The *plink* of glass drew itself out into that incredibly distant tone.

And from the bottom of the label upward, *the can disappeared!*

The pulse in Prell's ear seemed to stop altogether for a moment. Then it throbbed on firmly, exultantly. And as the note died, the can came blurrily into view.

Recognizing that moment as the most important one in his life, Horace Prell stood perfectly still for a minute, mallets in hand, trembling slightly.

Then he struck the bottles again. The can obligingly disappeared, a little longer this time.

Prell laid the mallets down. He felt suddenly weak, and sank down on a box to think.

Then he remembered the box at the back door. Instantly he rushed upstairs and found it. It had not come by parcel post or express, and he briefly wondered whether Emmanuel Smith (whose name appeared in one corner) had delivered it by hand. Prell picked it up—it was quite heavy—and hastened with it to the cellar.

He tore off the lid savagely. There was an envelope inside. Resisting the impulse to unpack the box first, he read the letter.

Dear Prell:

By now you know that I am not wasting your time.

The effect you have now witnessed impelled me to make two much larger Klein bottles, of bronze, tuned to the same note as the small ones, but several octaves lower. Imagine my disappointment when they failed to show the same effect!

Later I learned otherwise. What the smaller bottles merely concealed, these reveal. Set them up four feet apart. Stand between them, facing precisely 90 degrees to the line that joins them. Use the mallets enclosed to strike both at once, as hard as possible.

What you will see, I leave you to interpret for yourself. A word of warning: the tone of these fatigues the ear strangely. Do not risk the experiment by striking the bottles idly.

Emmanuel Smith

IT MAY HAVE BEEN Prell's cry that awakened Cora, or it may have been the dream. Wide awake instantly, she felt for his familiar bulk beside her.

He was not there, and, with the dream vivid in her mind, she switched on the lamp and fumbled into her mules. Pulling her robe over her shoulders, she headed for the cellar stairs. Light glowed from below, but all she could see from the top of the flight was the pile of cordwood stored at the bottom.

"Horace, are you still down there?"

"Yes. Yes, of course," answered Prell. "But what are you doing up so late?"

"I've been dreaming again—about you."

To this there was no answer, but, in the way of those who have a dream to tell, Cora took silence for permission to tell it.

"It was one of those dreams that other-being seems to make me have. But tonight I knew why. He was a scientist in his own world, and after learning what things look like here, and how we behave (all through telepathy, you see), he learned how to send things into our space. Real things made of our kind of matter by inverting some of their solid space. You hear me, Horace?"

He answered slowly. "You might talk louder."

"Well, what he really wanted was a sample of our kind of matter. You see, he could—he could generate a transmitter here, but somebody would have to work it. So he found out what you were interested in, and created some letters I must have told him how to write—I suppose I remembered from that month you were sick and I helped you with correspondence at home. Then he sent the transmitter, but it was a very simple one. It could only work on wavelengths like those doctors read in the brain—and so it could transmit only living tissue. He was sorry, because he had nothing against you, but he had to make you send yourself. You'd never suspect, because the transmitter was nothing but two bottles—"

"Two bottles?" asked Prell in a wire-taut voice.

"Yes. Queer little glass bottles—no, I guess they were bronze. And they sent you out of our space, into an in-between space where he could reach you. My goodness," said Cora in her normal voice. "Here I am, bothering you with nonsense. I'm going back to bed. You'd better come too."

"Cora, wait!" The voice from below was suddenly urgent. "I did make a queer experiment, and I seem to be in trouble. Get a flashlight and come down here."

A shiver struck through the chenille robe.

"A flashlight?" whispered Cora. "With all the lights on down there?"

She went down as she was, dreading every step, thinking that, anyway, the only flashlight they possessed was outside in the car.

"Thank heaven you've come, Cora," said Prell. "It was pitch black up to now, but I can see the flashlight at last."

Her throat seemed clamped in a vise. She looked at her hands, as if her eyes could put into them the flashlight that was not there.

"Hurry, Cora. You're still so far off; I seem to be seeing you through the wrong end of a telescope."

His voice, though audible, seemed to be incredibly remote!

Cora forced herself down the last step. Turning, she could see the whole cellar from end to end, mercilessly illumined by two bare bulbs. The windows were closed, the hatchway door bolted.

Two bronze bottles, gray-brown, horribly familiar, hung from the ceiling joists four feet apart. Her blood seemed to cease flowing as iciness engulfed her.

"Thank heaven you got here," said Prell. "The blackness was getting on my nerves. . . . Cora, what are you wearing? You look so strange—"

His voice knifed thinly through from nothingness.

"But you're not Cora!" shouted Horace Prell. "You aren't human—what are you? Cora, can you hear me? The air is thickening—I can't move. What have you got, whatever you are? A hook—like a knife. No—"

From an infinite distance and universes away, he cried out in terror.

The two bronze bottles gleamed dully in the prosaic glare of the naked bulbs. Light winked up at Cora from something beneath them—Prell's wrist watch.

Cora screamed. But by then she knew there was no one to hear.

Incident in Space



"The meteor ripped through our screens..."

Today Pluto Satellite III Station recorded one of the strangest messages ever received via wavecast ion beam. It is a tale in itself:

A Short-Short + by LAWRENCE E. LARKEY

Harris, Spaceman First Class, speaking.

Two things are uppermost in my mind at this time.

First, I now realize a long-dreamed-of ambition—the realization brings small satisfaction. It is a hollow mockery. I could now, if I wished, wear upon my shoulder pads, the gleaming stars and spheres that only the space-commanders wear—nothing would be said about it. To speak into this microphone is normally considered a great honor and an important function. I feel neither pride nor joy.

Second, we shall soon know if the operation Dr. Tata performed three weeks ago on Beckner, Crewman Second Class, is a success. That is all-important. If it were a failure, there is little point in anything we do. Although the operation was delicate in the extreme, those of us who are still alive, have not given up hope, even though we know how slim the chances of success really are.

It is for that reason that I now indulge in this absurd wavecast—stand here and beam this message out into interstellar space at random. Of course, I fully realize that the possibility that any intelligent being, let alone a man, will ever record this message is infinitesimal. In the distant, unguessed aeons to come, if any one should even find our dead ship, adrift amid the vastness of space, it would be truly remarkable. This wavecast beam will travel forever and ever. We would put our faith and prayers into it, except that we cannot tell anyone where we are, and it is doubtful if the beam could be traced.

The meteor ripped through our screens at least five Earth days ago and our precious air swooshed out. Men exploded like fish brought up from the bottom of the sea. My section was more fortunate than the rest. Our blood did not boil away, nor did our skin rupture. Only our more delicate organs suffered. Not all of the air escaped from the hospital ward where we were stationed, and the amount of blast and radiation was limited.

Thanks to the skill and ingenuity Dr. Tata displayed in this dire emergency, we can now converse with each other and hear in a limited sort of way. The man is undoubtedly a genius in his profession, but he has done all he can. From here on out it is Beckner, Beckner, Beckner.

We have food and heat, good air to breathe. The plants suffered little or no harm while the air was gone. The ship has automatically sealed off the damaged area, restored the air pressure and is still, mechanically, in operating order. Only, we are lost. We do not know where we are.

How much or how little we were deflected from

our original course by the collision with the meteor we cannot determine. We have no way of computing our position—unless, perhaps, Beckner can.

Fate is strange. Beckner almost did not sail with us. Space flights between suns are long, long flights. Not many men can endure the monotony.

Certainly the vast kaleidoscope of space is grand at first, but even the most beautiful flower would soon become commonplace if there were nothing else to see. The canopy of space is there all the time, and canned music grows tiresome, while movies are just movies, and games get on your nerves. Everything grows pointless. You eat to live and live to eat, and you wish there was some real work to do—and you long, above all else, for something to happen.

Dr. Tata had to have something to do. Beckner was the answer.

Beckner's eye affliction was beyond medical skill, at least so the specialists told him, but Dr. Tata thought there was hope. Beckner was not as enthusiastic as our ship's doctor—he had no reason to be hopeful, but he agreed, finally, to sail with us.

Dr. Tata performed one surgical operation after another, building up to the tying of optical nerves after all the transplanting was done. Finally he performed the last operation. Then he could only wait.

Right after the operation, the meteor struck.

Technically, such an accident should never have happened. Meteors should "bounce" off our hull, and they usually do. But this one did not. It must have been the angle at which it came at us, or maybe our force screen was at fault for an instant—there might have been a lag of power. Anything could have caused it. Perhaps we will never know. But the counteracted force caused a deflection, and threw us light-years off course. We have no pilot to chart our position. Each of us is capable, by training and skill, yet only Beckner can provide hope. So we wait.

The motors of our ship sing with power. We have enough food to wait even our entire lifetimes for rescue, but the odds against us are fantastic. Even if another meteor should penetrate our hull, the ship's pneumatic qualities probably would preserve us as before. The auxiliary power units would build up air pressure. But that is not what frightens us.

Each deflection must be corrected. And Dr. Tata and I cannot see. We can never see again to chart a new course, nor make a correction. Unlike Beckner, our eyes were unprotected. His were shielded with bandages.

You understand, Beckner is the only one of the entire crew that may ever see again. +

(Illustration by Frank R. Paul)

Saturn

SCIENCE

by ISABEL M. LEWIS

Formerly of the U.S. Naval Observatory



The rings of Saturn are not solid as had once been thought. Instead, the entire ring system is made up of tiny little moonlets, the largest of which is probably not more than four miles in diameter. It will be noticed that one moonlet is sliced in two. New York City, were it built on one of the moonlets, would appear as shown above viewed from about one mile above.

ONE OF THE most intriguing of all planets is Saturn, whose unusual ring system has no known counterpart in the sky.

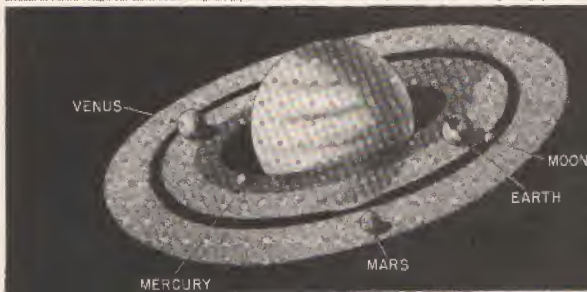
All the planets in the solar system with the exception of the two innermost, Mercury and Venus, are attended by satellites, but Saturn alone has, in addition to a large and imposing family of nine moons, three distinct rings of great dimensions which form a total mass composed of swarms of minute particles revolving around the planet.

Why Saturn should be the only planet to possess such a system of rings has not yet been explained in an entirely satisfactory manner. The theory of the origin of the Rings of Saturn is involved in the theory of the origin of the solar system, and every theory advanced to explain the manner in which the solar system came into existence must satisfactorily explain the cause of this peculiar appendage of Saturn. The process of the planet's origin, it is now agreed, could not have followed the course outlined by the Nebular Hypothesis of La Plave. However, an interesting law known as *Roche's Limit*, named from its investigator, states that no satellite of a planet can exist intact within 2.44 times the radius of the planet. This limit is spoken of as "Roche's Limit," and applying it to the planet Saturn we find that the rings of Saturn fall within this limit. It does not necessarily follow from this that the minute particles of which the rings are composed are the shattered remains of one small satellite but rather that they are the material from which a satellite might have been formed were it not so close to the planet. Within Roche's Limit the mutual attraction of the various particles for each other that would tend eventually to gather them into one body is overcome by tidal forces that arise from such close proximity to the huge planet. The stress and strain of such forces is so great that no grouping of particles can take place. This explains, possibly, why the rings continue to exist in their present condition. The total mass of the rings is known to be very small, for they do not disturb the motions of any of the nearer and smaller satellites, though tiny Mimas, 600 miles in diameter is only 31,000 miles beyond the outer edge of the outer ring.

An interesting observation was made a number of years ago of the passage of the rings of the planet between us and a star. Although the light of the star was diminished to one-fourth of its normal brightness when the rings passed before it, at no time was its light entirely eclipsed by any of the particles. It was computed that if the diameters of any of the individual particles had amounted to as much as three or four miles, the star would have been temporarily eclipsed. An upper limit for the size of the moonlets was thus obtained. The average diameter of the particles is probably much less than three miles.

The thickness of the ring system is not over 50 or 100 miles, but its total diameter is 172,000 miles. There are, in all, three

Comparison of Saturn's rings with the minor planets. If all the minor planets and our own moon were laid side by side, they would nearly cover the breadth of Saturn's rings. The moon would bridge the gap between the second and third ring. The thickness of the ring is roughly one hundred miles.



Queen of the Sky

concentric rings. The faint inner ring, known as the "crappe" ring, is invisible in a telescope under four inches in aperture. According to extensive measurements by Barnard of the dimensions of the planet and its ring system, the width of this inner ring is 11,000 miles. Just beyond the crape ring is the chief, bright ring, 18,000 miles in width. It shades gradually in brightness from its juncture with the crape ring to its most luminous portion at its outer edge, which is separated from the third or outer ring by a gap 2,200 miles in width, known as Cassini's Division. The third or outer ring is 11,000 miles wide and is less bright than the central ring. The inner edge of the inner ring is but 6,000 miles above the surface of the planet. On account of the curvature of the planet the ring system is invisible from the north and south pole of Saturn. As is the case with the satellites of a planet the inner particles of the rings revolve around the planet more rapidly than the outer particles. The innermost particles of the crape ring require but five hours for one journey around Saturn while the outermost particles of the outer ring require 137 hours to complete one revolution.

In addition to the gap in the rings known as Cassini's Division, several other fainter divisions exist. If a group of moonlets were to revolve around the planet in the positions marked by these gaps, their periods of revolution would be commensurable with the periods of several of the satellites of Saturn. As a result, the attraction exerted on such particles by these satellites would gradually disturb their motion in such a way as to draw them away from these positions. Therefore it is owing to the attractions of the satellites of Saturn for the moonlets that these gaps in the rings exist.

Resulting from the disturbances produced in the motion of the moonlets by the other satellites of Saturn, collisions are bound to occur occasionally among the various particles. When two particles collide the period of revolution of one or both of them is reduced, and as a result collisions tend to bring the moonlets gradually closer and closer to the surface of the planet. The dusky inner ring, it has been suggested, may consist largely of particles whose periods have been continually shortened by collisions.

Saturn therefore may lose its ring system in the course of time through its gradually being drawn down upon the planet by collisions of the various particles, until all of the material is finally swept up by the planet. Such a change would probably require millions of years, however, as collisions are probably infrequent. It is possible that the ring system of Saturn may have been much more extensive in the past than it is now, and other members of our solar system may have had such appendages in the far distant past.

The appearance of the rings of Saturn as viewed from our planet changes periodically as a result of the revolutions of the

Earth and Saturn around the sun, which places them in constantly changing positions with reference to each other. The rings lie in the plane of Saturn's equator, which is inclined 27 degrees to its orbit and 28 degrees to the Earth's orbit. Half the time, the Earth is elevated above the plane of the rings and the remainder of the time it lies below the plane of the rings. Twice in the period of Saturn's revolutions around the sun, which occupies nearly 30 years, the Earth lies directly in the plane of the rings and at this time the rings briefly disappear.

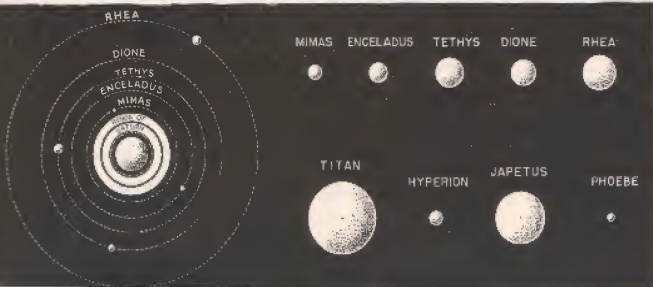
In addition to the rings, Saturn has nine satellites named in the order of their distance outward from the planet: Mimas, Enceladus, Tethys, Dione, Rhea, Titan, Hyperion, Iapetus, and Phoebe. The last-mentioned satellite was discovered by W. H. Pickering in 1899. It aroused great interest at the time because it was the first satellite to be discovered with "retrograde" motion in its orbit.

The satellites of Saturn approximate to those of Jupiter in size. The largest, Titan, is 3,000 miles in diameter and can be seen with the smallest telescopes. With a four-inch telescope five of the satellites can be easily found although they are not as interesting to observe as the satellites of Jupiter because they are on the average 100,000,000 miles more distant. The time they require to make one journey around Saturn varies from nearly 23 hours for Mimas, the nearest, to approximately 524 days for Phoebe, the most distant.

Like Jupiter, Saturn is marked by belts parallel to the equator, although they appear more indistinct than those of Jupiter on account of the greater distance of Saturn. Saturn also resembles Jupiter in its physical composition, which is largely if not entirely gaseous, and in the extremely short period of rotation on its axis—approximately 10 hours. In addition to possessing an enormous ring system Saturn is the lightest of all the planets, its density being only 63 percent that of water, and it is the most oblate, its flattening at the poles amounting nearly to one-tenth of its diameter. Its equator is more highly inclined to its orbit than is the case with any other planet, not even excepting the Earth and Mars. For this reason its seasonal changes are very great, in marked contrast to Jupiter whose equator lies very nearly in the plane of its orbit. Since Saturn is so far away from the sun that it receives only one-ninetyth as much light and heat per unit area as the Earth, its outer gaseous surface must be extremely cold unless considerable heat is conveyed to the surface from within its hot interior.

Professor Lowell concluded from certain observations made at Flagstaff, Ariz., that Saturn is composed of layers of different densities and that the inner layers are more flattened at the poles and rotate faster than the outer layers. Marked variations in the color and brightness of the ball of the planet have been noted from time to time.

Dimensions of Saturn, its rings, and orbits of the five inner satellites. Relative sizes of the nine satellites.



When one comprehends the vastness of the cosmos, the seemingly infinite procession of galaxies that compose it, each with its millions of suns and still more millions of worlds revolving around those suns, it is staggering to conceive of the diversity of life forms that could evolve within the universe. Picturing such life forms and situations that might relate to them requires more than mere imagination on a writer's part, it demands a real gift of words and feeling. Rarely has a science-fiction writer so sensitively captured the essence of alienity as has the author of this fine story.

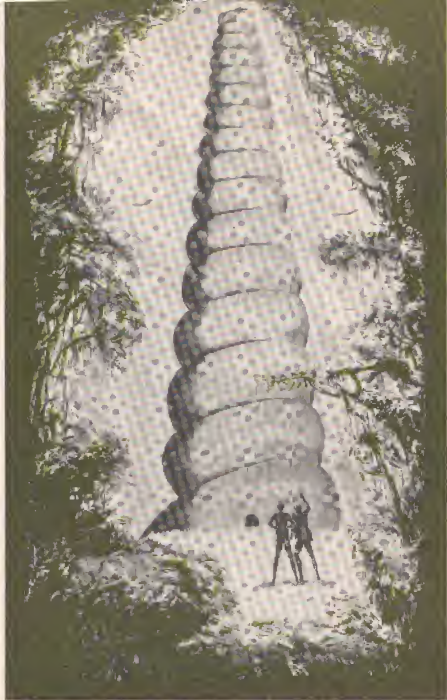
In his youth, Frank Belknap Long had aspirations as a poet, and did have published two volumes of verse, *The Goblin Tower* and *A Man From Gnomes*. Although the necessity for income has stifled this ambition, the flavor of poetry is in his writings.



by

FRANK BELKNAP LONG

(Illustrations by Charles Hornstein)



"It did resemble a gigantic sea-shell."

DONALD BREWSTER was alone. From the blazing wreckage of his spaceship to the canopy of foliage overhead the forest itself seemed to be conspiring against him, to be whispering and protesting as only a forest can when its age-old privacy has been invaded.

An immense emerald prison was the forest, fragrant with growing things, strident with the cries of snowy-crested birds.

It was a prison without bars, beautiful and strange and frightening. It was a naturalist's paradise, and

on Earth it would have challenged an explorer to take pride in loneliness and walk with squared shoulders.

But what pain could be greater than the pain of loneliness light-years from Earth, what agony of frustration harder to endure than the crystallization of emotion which took place in a man when his heart whispered that he would never see Earth again.

Never again the russet-and-gold splendor of an autumn landscape or the gleam of sunlight on familiar meadows. Never again a journey by sea and land—

THE SPIRAL

a journey made for delight alone with a woman tender and yielding at the end of it.

Few would deny that the most desolate fate that can befall a man is the fate of the hermit. To be surrounded day and night by the unknown and the unknowable, to call out and hear no answering voice, to be cut off forever from all human sympathy—who can be blamed for preferring death to such a fate?

No man perhaps. Yet Brewster did not want to die, and as the first shock of bitter realization wore off he found himself accepting with gratitude the fact that he was still alive and in full command of his faculties.

Whatever befell, he would fight to stay alive until his strength gave out. He inspected carefully the rations he had dragged from the burning ship, checking them item by item. Grim experience had taught him that strange fruits and berries were a major hazard, to be sternly shunned until hunger made a mockery of all caution.

He'd have to risk poisoning himself if his skill in setting traps failed him. But he refused to believe it would fail, and meanwhile, if he husbanded every scrap, he could make his food last for at least a week.

He pulled a flask from his pocket and took a long drink. Then he gave the bottle a pat, corked it firmly, and returned it to his hip.

"First lesson in survival," he muttered to the jungle shadows. "A man's best friend is himself—first, last, and all the time."

Five minutes later he was threading his way through the forest in search of a place to camp. A sun much hotter than Sol burned down like an angrily pursuing eye, mocking his confidence and making him feel suddenly fearful, and less sure of himself.

It irked him to realize that the planet was down on the charts as an uninhabited world. There was an abundance of animal life, but no chance at all that he might be given food and shelter by friendly natives.

He comforted himself with the thought that humanoid creatures were as often as not unfriendly. To see a creature intelligent enough to have mastered the use of fire come loping out of the jungle on eight stalk-like legs would not be a pleasant experience, and if a man were himself unarmed—

BREWSTER'S THOUGHTS congealed. He stood utterly motionless, refusing to believe in the reality of what he saw, telling himself with a sudden, tremendous tensing of his muscles and nerves that he had escaped death too recently to have it confront him again in so horrible a form. It was against all reason, a twist of fate too cruel to accept at face value.

The lizard towered directly in his path. It had emerged from a tunnel of dark vegetation less than seventy feet ahead and it was staring straight at him—a scaly and vermilion-crested monster with a row of armored spikes running the length of its spine.

There were shadows where it stood, a mingling of sunlight and darkness which in some queer way made its swaying bulk seem even greater than it was.

A flicker of light gleamed on its bared teeth, and it was staring with the malign ferocity of a carnivorous beast aware of its own strength and agility, a beast that had come suddenly upon a prey that could not possibly escape.

Brewster was still frantically telling himself that it was an illusion—when a gun roared nearby.

The roar was deafening, but its reverberation was almost instantly drowned out by the lizard's piercing scream as the monster went hurtling back into the underbrush, its body cut in two.

There was an instant of silence, complete, mind-numbing. Then from the underbrush stepped a tall man with a smoking gun, his face peering mournfully into the shadows as if he felt pity for the beast he had been forced to slay.

Amazingly he wore a uniform which Brewster recognized, but had never expected to see again. His eyes were steel-gray and piercing, his cheekbones prominent, and his nose a sharp, bony ridge slightly flattened at the tip.

White-lipped, shaken, Brewster shifted his weight from one trembling leg to the other. He waited for the stranger to speak, but the tall man seemed in no hurry. He stood for a moment nodding at Brewster, as if to give the man whose life he had saved full opportunity to regain his composure.

Then, suddenly, his ruggedly handsome features widened in a grin. "Ugly brutes, those lizards. For all I know they may be harmless. But the odds seem definitely against it."

"Harmless—"

The tall man chuckled. "Well, I've never been attacked by one. I've been careful to keep out of their way. At fifty feet or so a wrong guess might kill you. That's why I blasted when I saw how close you were." Brewster shivered. "I'm glad you didn't waste any time thinking it over!"

"So am I!" The stranger's grin was enlivened by a merry twinkle of voice and eye. "Guess I should introduce myself. I'm Captain James Emery, United States Interstellar Survey. We had a crackup some two months ago, and we've been living off the land ever since."

"You're not alone then?"

Brewster was still so shaken he was afraid the other might think him lacking in courage. But Emery answered his question in a tone which had nothing of contempt in it, only a warm friendliness.

"No, my wife came along to look after me. She's a Survey officer in her own right, but this is the first time we've explored a new planet together. The trip was to be a kind of second honeymoon for both of us."

He nodded. "It's funny, you know. When you emerge from overdrive tens of thousands of light-years from Earth you get a feeling of renewal, of rebirth. There's a brightness and newness about everything, and you're not weighed down with memories."

His eyes grew speculative. "The psychos could probably explain it. There was a character in one of Shakespeare's plays who lightly dismissed a crime

INTELLIGENCE

he'd committed by claiming it happened long ago and in another country. It's easy to find that amusing—or viciously cynical. But I've always felt Shakespeare's scoundrel displayed profound insight. Time and distance *does* make a difference, even when you're *not* a scoundrel."

"That's an angle I didn't have time to think about," Brewster said. "My ship cracked up and caught fire. I was looking for a drier place to camp when that lizard appeared I thought I was having a nightmare." "They're agile," Emery conceded. "First you see them, then you don't."

Brewster did not smile. He was staring at the Survey officer as if amazed by the tricks of fate.

"Do you know—I wouldn't be here at all if my sensitive instruments hadn't analyzed every ounce of metal in your ship far out in space," he said. "I had no way of discovering that the metal was in a wrecked spaceship. I thought that there was a rich lode of Ullurian ore here in a natural state. That's why I headed straight for this vicinity and was probably wrecked by a repetition of the same ugly weather conditions that you ran into."

Emery nodded and gestured toward the forest gloom, his rugged features sympathetic.

"That's quite possible," he agreed. "Even those trees are no protection when the elements really cut loose here. But at least we've found a place to camp. You're welcome to share it with us if you don't mind taking pot luck with a man whose only specialty is hunting food animals. Without my instruments I'm just the bright lad who got himself shipwrecked without a compass or a guiding star."

"I don't mind at all," Brewster said.

"Fine! I forgot to ask your name—"

"Donald Brewster, I'm a rare-metal prospector, as I guess you're not."

"Welcome to the third planet of the bright star Rutilius, sir. Welcome to a camping site that's distinctly on the unbelievable side."

He seemed amused by Brewster's puzzlement. "Believe it or not, we're camping in a circular limestone tower eighty feet high. It's not a ruin, exactly. It's more like a big sea-shell rising from the forest floor, scoured and glistening inside and out."

"You mean it really is a shell?"

Emery shook his head. "I wouldn't call it that. Only a highly intelligent creature could have built it. The individual limestone blocks are perfectly aligned, and the design as a whole is far too imaginative to be accidental. It could have been constructed only by some creature with an eye for beauty of design."

He laid a friendly hand on Brewster's shoulder. "Come see for yourself," he said. "It's less than ten minutes' walk, if we keep to this path."

It was an incredible walk. Butterflies as huge as dinner plates, vivid scarlet and aquamarine, rose in swirling clouds before them, and half-blinded them with their fluttering. Little fuzzy creatures with enormous ears peered from rifts in the foliage, and then shrieked and vanished like startled elves, leaving behind them a faint odor of musk.

Once the survey officer seized Brewster's arm and pulled him abruptly to one side. In the path a ten-foot snake reared, its viper-like head repulsive with jungle phosphorescence. They found their way blocked in another place by a hideous swarm of blood-red worms, and in still another by a

brooding bird with iridescent plumes and a huge gular pouch.

The bird refused to budge until Emery bent and gave her a gentle prod. Then she arose and went screaming away through the forest, leaving behind two pale-blue eggs which Emery gratefully pocketed.

The path changed direction, and the great trees thinned a little.

The clearing was visible for a full minute before they reached it, a glimmering oval in the foliage-choked jungle wall directly ahead, growing continuously brighter.

EMERY WAS THE first to emerge. He swung about and watched his companion claw his way into the open. He was eager to observe Brewster's expression when he first set eyes on the tower.

The Survey officer's curiosity was satisfied almost instantly, and in a wholly satisfying manner. Brewster had been told what to expect, but there was a look in his eyes as he stared which left no doubt that his imagination had left enormous gaps. The beauty and vitality of the tower had to be seen to be appreciated.

It did resemble a gigantic sea-shell, but its smoothly flowing whorls and convolutions bore the unmistakable stamp of intelligent artistry.

There was a circular opening at its base, visible clear across the clearing, and in the opening stood a woman whose face and figure, once seen, could not be readily forgotten.

Helen Emery must have heard her husband coming and had gone to the door to meet him. Brewster could see her smile clearly, the flash of ivory-white teeth. The sun touched warm glints in her hair, and her dark eyes were bright with an eager questioning.

In a moment the two men were at the door, and Helen Emery was greeting her husband. Brewster could see that her love for him was both strong and elemental. It was in the caress of her fingers on his face, in the tenderness of her expression, in the very way she held herself when she kissed him. An instant of fulfillment it seemed, complete in itself, as if he had been gone from her for a whole lifetime. Then she turned quickly to Brewster, her eyes wide again with unspoken questions.

Emery talked with her for a moment, raising his voice a little so that Brewster could hear everything that was said. When he had finished Helen Emery came forward and took Brewster's hand in hers.

"Welcome to Riddle Manor, Donald Brewster," she said. "It may be a long time before we see Earth again. I'm glad we're not alone, as we feared."

"I'm glad too," Brewster said.

"Where are you from, Donald?" Helen asked. "New York," Brewster said.

A roaring seemed to fill his ears as he spoke. He saw smilgint bright on gigantic metal buildings, heard the scream of jet planes, the deep, never-ceasing drone of the underground.

He saw the bright waters of New York Harbor, the tangled maze of shipping in the harbor, and the spaceports of New Jersey hugging the shores of the outer bay. He blinked, and the bright, tremendous vision was gone.

"I'm from Boston," Helen Emery said. "The Charles must be beautiful now. In the autumn, when the leaves start to fall, and you can see the golden dome of the capitol—"



Emery put his arm about his wife's shoulder and together they entered the tower. Brewster followed—and halted abruptly. With a shock that almost made him doubt his sanity he stared up at a series of ascending platforms, each circular and slightly overlapping, the entire structure towering to the roof.

The staircase—if it were a staircase—rose like a burst of frozen energy, its summit a snowy disk, the individual platforms grooved and notched and scooped out in weirdly symmetrical fashion.

Emery and his wife paused on the third platform, and Brewster saw two rude couches fashioned of boughs, an ammunition box, and another gun, its barrel, gleaming blue-black in the shadows. Scattered about were other articles of camping equipment—a tiny magnetic stove, metal eating utensils, and even a charred and badly-dented camera.

Helen turned, her eyes sweeping the platform. "This is all we could save from the wreckage," she said, with a wry grimace. "Luckily we've had good shooting. I've decided that Jim is the best marksman in the Survey, harring some white-mustached old colonel I've never even met."

Emery laughed. "I'm no better marksman than she is a cook, Donald."

He patted her shoulder. "She'll have dinner ready before this place can really start to haunt you."

Emery never forgot his first dinner in the tower. It was like nothing he could have imagined, its goodness matching the hospitality of Jim and Helen—friends completely new. As they ate they talked.

"What's it like to be a rare-metal prospector, Donald?"

He told them, keeping many things back but wishing that he could find courage to be completely honest, for once in his life. He told them about the narrow escapes, the loneliness of the extragalactic planets, and the moments of wild joy and triumph when a ruined humanoid city or desolate crater yielded minerals unknown on Earth.

He matched shining stories with Emery, fire mountain with fire mountain, strange animal with strange animal, morning mist with sunset splendor. But he forgot to mention how he had cheated and lied his way to wealth, how he had won and lost and won again with loaded dice. He was silent about the disloyalties and betrayals, the false salvage claims, the ships deliberately wrecked.

Finally the shadows of evening crept into the tower, and the setting sun dyed the ascending spiral red, and they knew it was time to put an end to talk.

Brewster stood up. "Are the nights cool?" he asked. "Cool enough," Emery said. "Why, Donald?"

"I was thinking it might be a good idea to bunk near the top. If you don't mind I'll climb up and look."

"Sure, go ahead," Emery said. "Helen and I just picked a platter at random."

He smiled. "We've got into the habit of calling those platforms 'platters.' Just imagine how nice it would be to have one set before you at mealtime, filled to the brim with a steak-and-mushroom dinner."

His smile increased in volume. "I can't promise you a bat won't fly in and wake you up. But it's cool and comfortable enough at any level. If it's privacy you're worried about—these overlapping, scallop-shell edges guarantee that."

"If you were right up above you couldn't see us," Helen said, laughingly. "We'd be hidden away in our own jungle paradise."

"You're making it tough for a lonely bachelor," Brewster complained. He drew a deep breath, and

picked up his ration kit. Then he turned and looked up. "I might as well climb to the top anyway. If I don't like it up there I'll descend a few platters."

Emery chuckled. "Prefer to be lord of all you survey, eh?"

Brewster started, and looked at the survey officer closely. He saw at once that there was no hidden meaning in the other's merriment and to hide his confusion he started quickly up the spiral.

He turned once to call back. "That dinner was really special! Thanks again!"

"Glad you enjoyed it!" Emery shouted. "See you at breakfast."

It took Brewster a full minute to reach the heights. The disk at the top was enormous, its edges curving upward. Breathing heavily, he sat down on a projecting limestone shelf, and dropped his ration kit.

He looked up in awe. It was curious, but the oddly-fashioned grooves and hollows in the walls of the tower made him think of an old nursery story from childhood. Even a few of the words came back, although he wasn't sure of the exact phrasing.

And she slept in each of the three beds, and ate from each of the three bowls. The first bed was very small, and the second not large at all. But the third bed was enormous.

BREWSTER UNLACED his boots, and leaned back with a weary sigh. The shadows were growing darker, and they seemed to cluster about him as if seeking to drain warmth from his body and mind. The sun no longer bathed the roof of the tower in a rosy light.

He shut his eyes and relaxed completely.

There is an interval between sleeping and waking which can be sensed by the dreamer even as the long night can be sensed. But Brewster could not even remember the numbing drowsiness which usually warned him of the approach of sleep. He had experienced neither the long night nor the surprise of awakening from a borderland state of half-slumber in which the firm contours of reality remained elusively remote.

Was it a dream that he was having, a terrifyingly vivid dream? Or was he awake and in the grip of some strange power, some alien intelligence, which had seized control of his mind?

Of one thing only could he be sure. He was in another world. It was a world of tremendous contrasts, of sea and jungle, of rain and searing sunlight. He seemed to be walking through it, but more slowly than he had ever walked before. He seemed almost to glide, to crawl over the ground.

It was a world of thunder and tumult. You could stand by a sea-wall and stare out over rocky headland separated by miles of blowing spray. You could swing about, and glide inland through a flowering wilderness over paths of snow-white coral.

In the inland world there was no thunder and no tumult. If you listened carefully you could hear the furtive movements of little animals, the whirr and drone of invisible insect life. But unless you were skilled in Nature's ways you might suppose yourself in a garden of enchantment, with each fruit-bearing tree and blue-and-vermilion flower artificially designed to create delight.

The spaceship was a tiny dot at first in the depths of the sky. But it grew swiftly larger, sweeping straight down toward the sea wall like a wind-huffed cocoon. It circled and wheeled and swept ever lower, the sunlight glistening on its cylindrical hull.

Then it was resting motionless in the garden wilderness, and all about it the startled wild life of the region was protesting the intrusion. Sea birds shrieked and circled, dipped and wheeled, and outraged lizards hissed and slithered like clockwork automatons into their burrows on the landward side of the sea wall.

The ship burst suddenly into flame.

He watched the conflagration, saw the tremendous sheets of fire darting skyward. He watched, alone and appalled, and the slowness of his movement toward the ship was like the slowness which afflicts the terror-stricken in dreams.

Yet now more than ever he felt himself to be awake. The feeling remained when the immense white buildings and the glittering instruments of science came to replace what he had seen by the sea-wall, and he heard voices whispering deep in his mind.

"I knew that we could heal them. But they were so close to death when we removed them from the wreckage I feared our task would be a difficult one."

"Even if they had died—we could have healed them," a second voice said. "Every living tissue carries within itself the somatic pattern of the organism as a whole. We could have restored and revitalized their bodies and their brains from a single living cell."

The voice paused, then went on. "Somatic death is never instantaneous. The brain dies more slowly than the body, as energy-discharge tests have shown, and there are always a few cells which survive for an incredible length of time. Even without the aid of a nutrient fluid we could have kept a few cells alive."

"That is true," the first voice agreed. "Had they died the vast complexity of their brain would have continued to survive in rudimentary form in a single neural filament. From a tiny living fragment of damaged brain tissue teeming with neurograms—the basic patterns of memory and inheritance—we could have reconstructed all of the perished stimulus-response circuits and linked memory-chains which are the wellsprings of thought, of imagination and desire."

"Life would have returned in all of its stormy splendor, for intelligent life is like a great sea in its restlessness. It may seem to have ebbed forever, but the slightest under-surge will lash it to hurricane violence and send it crashing across the beaches of eternity."

"You cannot confine life to a single planet of a single star, and even as it perishes it lights torch after torch on its stormy crests and hurls them afar to dazzle other worlds with its dreams of survival."

"Fortunately these two did not die, even though their injuries would have resulted in death if we had not healed them by a combined application of surgical techniques and somatic revitalizing rays."

"Every such victory over death is a milestone in the progress which science must make if intelligence is to increase its mastery over the blind forces of Nature. We have built a great and enduring civilization by holding fast to that one aim—the conquest of Nature by patient research alone. But we must never forget that our greatest victories lie ahead."

There was a swirl of brightness and Brewster became aware that he was inside one of the buildings, staring at moving shapes that loomed semitransparent in the gloom.

Standing side by side in what appeared to be a high-walled laboratory glittering with instruments of science such as he had never before seen were two white limestone slabs, each supporting an unmoving human form. Behind the slabs towered gleaming transparencies of metal and crystal, and a circular, mirror-like object which reflected spots of light down-

ward on a man's drawn face and a woman's tousled, dark hair.

The man and the woman were naked in the glow. For a moment the downstreaming rays penetrated the shadows in steady shafts. Then they lit filaments of darting flame upon the woman's head and shoulders, and traced out a fiery circle about the torso of the man.

Slowly the light weaved back and forth, assuming changing patterns, and from behind the mirrorlike object something arose in the flame-streaked gloom that was not a machine. Something huge and white with protruding eyes and sluglike horns projecting from its head. It was quickly joined by another of its kind.

On the slab Helen Emery stirred and opened her eyes.

Then brightness again and the scene changed. There were dark clouds across the entire sky, obscuring the outlines of the white buildings. Lightning forked down, shafts of blinding radiance circled the sky.

Did the radiance come from the buildings themselves? Brewster was never to know, for he fell at last into a deep sleep and did not awaken until dawn came to the tower.

Awakening, he felt for an instant a sense of unreality, a suspension of reason that made his temples throb. He arose in alarm, and stared down the enormous spiral that sloped away beneath him.

In the cold gray dawn what had seemed merely incredible took on a nightmare quality of fantastic madness. How could his mind interpret thoughts from a nonhuman brain? How could he see images and hear voices his memory had never recorded?

Did something dwell in the tower that could physically implant itself on its surroundings, as the sea could be tinted red by a sunset, or the jungle darkened by the shadow of a dangerous beast? Everything was quiet now. Everything was completely peaceful. Yet what he had seen and experienced could not have been a dream.

He knew what psychologists had discovered about the nature of dreams. It was a peculiarity of dreams that inner experiences were expressed in such a way that the mind was freed from the necessity of feeling deep concern for others. That had been positively established. Tests had been made which left no room for doubt. And in dreams the events which took place were subject to a special logic of their own which could seldom be justified on awakening.

But then—could the logic of what he had seen and heard be justified? Could an alien science cheat death on the planet of a distant star, light-years from Earth across the great curve of the universe? Could a greater science than man's restore the mortally injured to warmth and life and fire?

They'll know, he thought. If their ship circled a sea-wall they'll remember. I'll ask Jim and Helen to take me to the wreckage.

He looked up, and saw the dawn warming the sky through a window high in the tower. The sky was as bright as any dawn sky on Earth, and deep in the forest birds were singing.

They'll know; they'll tell me.

HELEN EMERY was bent above the tiny magnetic stove, her hair aureoled by the dawn light. She looked up quickly when she heard Brewster descending.

"Is that you, Donald?" she called out. "You're up early, aren't you?"

He appeared suddenly before her, his face drawn. "I hardly slept at all," he lied. "I was too tired, I guess. More badly shaken up than I realized. Where's Jim?"

"Taking an early morning dip," she said, brushing back a strand of hair that had fallen across her forehead. Dark hair, that had lain in a tumbled mass beneath shifting lights and shadows.

She seemed embarrassed by his stare, and added quickly: "It's only a ten-minute walk to the sea-wall. I wish I enjoyed bathing in the sea as much as Jim does. I was born inland, on a farm, and I never saw the sea until I was eighteen."

The sea-wall!

He never quite remembered how he persuaded her to take him to the wreckage. The shock of her words had started a whirring in his brain, and he had only a confused recollection of giving her some very logical and plausible reason for wanting to make the trip. More sharply impressed on his mind was her quick nod of agreement.

It was an easy journey they made, along a path previously cleared. There was silence between them, broken only by the occasional crackle of a twig underfoot. They saw no birds or reptiles, but once a tiny mole-like creature darted across their path and vanished in the underbrush with an eerie screeching.

A few minutes later they heard the roar and crash of the sea. The vegetation thinned and fell away, and they emerged into the open.

A startled cry burst from Helen Emery's lips. She stood staring, the blood draining from her face, her eyes wide with stark disbelief.

Suddenly she was running—running straight toward the bright new ship which stood by the sea-wall.

"It's our ship!" she cried. "Donald, it's the ship that brought us here! What could have happened? How could it have been rebuilt?"

Brewster stared at her still in motion, shouting the questions as she ran. Without replying he joined her beside the ship, a stunned horror in his eyes. He reached out and felt the cool, shining metal of the port locks. He looked in through a gleaming viewpane at an intricate cluster of navigational instruments.

Fear came and stood beside him, and for a moment his eyes wondered to the sea-wall and came to rest on the shadows lurking there.

The dawn of understanding. It touched his mind, and retreated, and came back again. An intelligence so powerful that it could impress its thoughts on its surroundings would not find it difficult to rebuild a wrecked spaceship—even a ship gutted by fire. An intelligence of such power equipped with instruments of science could do . . . almost anything it wanted to do.

A trembling seized him and he could hardly trust himself to speak. The ship had been rebuilt for a purpose. What purpose? To study its construction, as human scientists would have studied a strange ship wrecked on Earth.

He had to be alone. To think—and reach a decision. An opportunity had presented itself and with opportunity had come a choice he would have to make. It was a decision which could not be put off, could not be delayed another instant.

He tried to speak calmly, tried to keep his voice from betraying him. "Get Jim," he said. "Jim

must be back by now. He'll know if this is really your ship."

"I'll bring him as quickly as I can," she promised. "But I'm sure it's our ship. The instant I saw it I knew, I could tell."

She looked at him steadily for a long moment, as if trying to read his mind.

"I won't be satisfied until Jim is sure too," he said. "It means—there is intelligent life on this planet. It means that we're not alone, as we thought. We're being watched—studied."

Her eyes widened in sudden alarm. "You really think that?"

"What other explanation is there? What other possible explanation?"

"I'll get Jim," she said.

She turned, and was gone.

Brewster stood for a moment listening to her footsteps die away. Then he turned back to the ship, his mouth strangely dry.

He entered the ship through the open port-lock, and stared about him. Everything seemed incredibly new—new and bright and shining. He saw the double pilot seats, facing the controls. He went to the instrument board, tested the air pressure, and looked out through the viewpane at the green immensity of the forest.

In the small compact control room there was a security which could not be found in the forest, or by the sea wall. The forest could kill in a thousand cruel ways. And by the sea-wall lurked shadows which could threaten a man's sanity.

In the forest a man could die horribly, and his bones lie bleached and whitening under cold stars.

There were two pilot seats, but one man could pilot the ship. There was room for two—but not for three. The ship could not carry two men and one woman back on overdrive to Earth.

The jungle was green and threatening outside the viewpane. The jungle whispered: Do not be a fool! This is your chance! Act quickly!

Brewster climbed into one of the pilot seats.

He stared out into the green jungle. But he did not see the jungle. He saw New York.

He was back in that tremendous city, the lights of evening fading from the windows of the buildings he loved, the rooftops shining clear in the heavens.

He was back in New York with a lot of money to spend. He was back in his favorite restaurant at his favorite table. It was dark outside, he could see the stars shining in the winter sky. The wine was poured quickly, it bubbled in his glass.

Opposite him sat a woman. Her name did not matter. He only cared that she was a woman, tender and very beautiful, and that if he lost her, there would always be another woman waiting.

He shut his eyes and she was tight in his arms. Her lips were fire, and the words she spoke to him would have prevented him from seeking another. He would have welcomed that too. He would not have cared.

Brewster climbed down from the pilot seat and went outside to wait for Jim and Helen.

The jungle screamed at him: You're quite mad! You had your chance! Why didn't you take it?

There was no answer he could give the jungle. He could not seem to bring his thoughts into clear focus. Two strangers had welcomed him as a



"A floating disk-like object emerged dazzling his eyes with its brightness."



friend, had trusted him completely. But that was no proper answer. It explained nothing, really.

HE SAW THEM APPROACHING along the path and straightened in sudden concern. He'd be having a time with Jim. You couldn't just say to a survey officer: *Your ship was wrecked, and you were close to death. But an intelligence whose existence I cannot even prove healed you. It rebuilt your ship too. Climb in and take off. Hurry, Jim! Before they try to stop you. If they could read our thoughts they'd be here now, they'd stop you cold. There must be a mind block of some sort. Take advantage of it, Jim! Don't just stand there staring at me!*

For a survey officer had an approach to reality that would never give ground that fast. He'd have to be convinced first, and that would take time.

"Donald, when Helen told me, I couldn't believe it. I thought it was some sort of gag you'd cooked up between you. I—I've got to sit down."

Brewster looked up and saw Jim standing before him. Not the Jim he'd imagined himself opposing, but Jim the flesh—an even harder Jim to argue with.

Emery sat down on a tree stump and stared at the ship.

"How did it get here?" he asked.

"We found it here," Brewster said.

"It is our ship," Helen said. "Have you any doubt at all, Jim?"

"I'll know when I've looked at the instrument board."

Emery got up then, and went into the ship. Brewster and Jim's wife followed. Jim walked slowly

around the control room, his lips tight, his eyes shining strangely.

Emery moved about the ship like a man in a trance, his eyes roving from the control board whose dials indicated ample fuel reserves and perfect mechanical, electronic functioning, to the orderly, properly fastened array of essential equipment. But a frown creased his face when he observed only two take-off pressure coaches.

"Good Lord!" he muttered. "It just can't be. It's against all reason."

Brewster knew then what had to be done. He was no hero. His past was crammed with so many things he wanted to forget that one more sordid episode wouldn't have appreciably darkened the whole. This was, however, the first time he could remember being treated as a decent human being. It was a new experience. There comes a time when a man has to give as well as take.

"Jim!" he said.

He waited until Emery had turned and was facing him.

"I've never had two better friends than you and Helen, Jim," he said. Then Brewster sent his fist crashing against Emery's jaw. It was a hard, quick blow, and it dropped Emery to the deck.

Helen cried out in horror.

Brewster turned and took her by the shoulder. She tried to wrench free, her eyes wild, but he refused to release her.

"Listen to me," he pleaded. "Jim told me you were a survey officer too. You know how to pilot this ship."

"You struck him for no reason at all."

Brewster shook his head. "I had a reason. We're in very great danger, but I couldn't have convinced him. He wouldn't have listened. But he's your husband, and he's helpless now. He's your man—and a woman in love will always listen."

"Listen to what?" she asked, fiercely.

"I'm going to stay and draw the danger away from you. I'm going to make myself a target. But don't get the silly idea that I'm sacrificing myself. If you stay Jim may be the target—but my chances won't be any better."

He shook her, a little roughly, solely to anger her.

"Do you understand? I'd have to stay anyway. But you can save Jim by using common sense."

She ceased to struggle suddenly. She stared at him, her lips white. "Do you really mean that?"

"Of course I mean it. I'm going outside. As soon as I'm clear—I want you to take off. Just give me thirty seconds to get clear."

He didn't wait to say goodbye. He crossed the control room in three quick strides, and swung the port-lock shut behind him.

He was seventy feet from the ship when it took off with a thunderous roar.

He walked slowly back through the forest, keeping to the path that seemed somehow now to be his last link with Earth.

A sense of almost overwhelming loneliness came upon him when he saw the tower through the trees, its summit bright with weaving sunlight. Yet he

walked across the clearing with his shoulders held straight.

The tower had become suddenly very precious to him. In the tower he had enjoyed a truly wonderful hospitality. He had known himself for the first time in his life as a man capable of friendship, warm, deep and lasting.

Horribly lonely and deserted the ascending platforms seemed now. Each shadow seemed to mock him, increasing his sense of loss, heightening the desolation which rested upon him like some evil cloak which had begun to grow into his flesh.

Higher he climbed, and higher.

Near the top of the spiral he paused to stare down. *And suddenly he knew the secret of the tower.*

The tower was a house.

On Earth a house was not a home until it had been lived in. When a house became a home it changed subtly. The people who lived in it changed it.

If walls could speak and tell their secrets—

But walls had spoken. How else explain the visions he had seen, the voices he had heard? Some wise and tremendous intelligence had built this house and it was now a home.

And why could not walls be made sensitive to waves of thought, just as photoelectric cells were sensitive to the approach of a physical body acting upon them from a distance. A science that could heal the mortally injured would find no difficulty there.

Brewster sat down at the edge of the topmost platform, and stared down the spiral, remembering the visions he had seen of a planet of tremendous contrasts, of sea and sky, miles of blowing spray and primeval jungle.

On the shores of Earth's seas dwelt enormous mollusks. Enormous for Earth, but here he had met in the jungle a lizard twenty feet tall.

A snail would not have to remain permanently attached to its house. On Earth there were mollusks which could leave their shells at will.

The ebb and flow of the sea tides, the surge of the great sea that never ceased. Would not an intelligence having its origin in the sea prefer to roam, to join itself to that surge and return to its house only at intervals?

How easy it was to imagine such a creature, weary at last of its roaming, climbing up a sea-wall in its shining eagerness to be home.

The strange grooves and hollows.

In a mollusk's body were similar grooves and hollows, for a mollusk must mold itself to its spiral house, must flow into every crevice and fill its house completely.

Brewster sat very still, listening to he knew not what, his nerves suddenly tense.

On Earth there were mollusks with great horny feet which could be fitted into grooves such as Brewster saw here on the immense spiral which fell away beneath him.

A scientific intelligence, thought Brewster, could be completely lacking in compassion. It was possible that he had saved his friends from a fate worse than death—for the lot of the experimental guinea pig was never a happy one. But it was equally possible that the intelligence might have been moved by a spirit of altruism. To restore an alien life-form and the ship which had brought that form to its own world might have appealed to it as a kindly and generous thing to do.

In that case Jim and Helen Emery would have been in no danger, and their departure would have fulfilled the original design of the intelligence. But if

the intelligence had no such altruistic design in mind—might it not feel itself thwarted, and vent its rage on the one responsible?

Well, if he had to be a guinea pig—

The lapping was barely audible at first, a hollow mockery of sound that fell so lightly on Brewster's ears that if he had not been listening with every nerve alert he would have thought it a breeze blowing in from the sea, rattling the dry leaves of the forest.

He knew when he heard it that he could not hope to escape. He remained motionless, listening as the sound grew louder, listening and waiting and fighting back his fear. Louder and louder it grew, and suddenly a shadow fell across the base of the spiral that could only have been cast by a flowing shape moving with the resistless slowness of the sea tides themselves.

Straight up the spiral swept the owner of the house, darkish portions of itself slithering over the ascending disks, and into the grooves and hollows. Closely and ever more closely as it ascended it molded itself to the spiral's convolutions, as if the spiral were intimately a part of its mind and its flesh.

It had returned completely into its house, rearing a great, horned head and staring down at Brewster with eyes that seemed to probe his very soul.

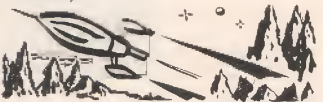
Suddenly, from a crevice in the uneven limestone a floating, disk-like object emerged and swept down toward him, dazzling his eyes with its brightness.

Incredibly intricate in construction the disk seemed, its numerous knoblike projections and delicately glowing tubes proclaiming it an instrument of science designed with accuracy for a specific purpose.

That purpose Brewster sensed even before the tubes attached themselves to his brow. The walls could speak and this was their voice—an instrument of communication of a thistledown lightness which responded to every thought impulse generated by the owner of the house.

Generated by guests as well? And why not? An automatic caretaker, perhaps—taking down messages in the owner's absence and repeating them on the owner's return. Absorbing impressions from every part of the house, from millions of tiny photoelectric cell mechanisms embedded on every tier. Attaching itself to friend and foe alike—

As the tubes at Brewster's temples lit up his face he knew that the strangeness and mystery of it would forever haunt him. But he knew also that the questions he would never cease to ask himself were of less importance than the simple fact that the owner of the house was using the device now to communicate with him directly.



"For you!" a voice whispered, deep in his mind. "We built it for you, Donald Brewster!" Almost the great horned face seemed to smile. "It will take you back to your home planet!"

Brewster saw the ship then, standing by the sea-wall in a blaze of sunlight. It was a beauty—the most beautiful ship he had ever seen.

He blinked and there was a stinging at his eyelids. He wanted to stand up, to get to his feet and shout his gratitude. But so great was his surprise and delight that all he could do was stare. +



New York 2046 Transportation System: 34th Street looking East. No Parking, no private vehicles. Atobuses overhead. All freight deliveries underground via freightsubs.



The WORLD

• the next hundred

The present era will most likely go down in history as the "Atomic Age." This new era started on August 6, 1945, with the explosion of the first atomic bomb. Here is a preview of the first 100 years of the Atomic Age—as the world will look in 2046. It will probably be the most eventful, the most revolutionary, and possibly the most cataclysmic century since the beginning of recorded history. What can we expect in this new age? How will it affect our lives? You will find a tremendous wealth of entirely new data in this article. You may think that much of the material is far-fetched, but it has been checked carefully by several noted scientists and no objections offered. Any errors that do occur will be in the realm of time—some of the forecasts have already materialized since the article was first written, notably the atomic battery and the effect of atomics on agriculture. This article, in its original form, was first published in the author's annual Christmas booklet, entitled TAME (a parody on Time Magazine), Christmas 1945.

100 Years After

If the illustrious band of physics-scientists who released that fatal atomic bomb on August 6, 1945—thereby ushering in the atomic age—could return to this year 2046 A.D., they surely would gasp long and incredulously at the result of their long labors way back during World War II, 1943-45.

The old-time U.S.A. has completely vanished from the scene. This new land, throughout its length and breadth, now comprises a vast blooming garden, providing three bumper crops yearly. In the big cities, there is no rain except at night; ice or snow is

unknown; there are no traffic jams, no infectious diseases, no colds, no cancer, no strikes. Great factories, operating by atomic power, hum unendingly—260 million lusty Americans, who have had no war in 68 years, yet have too much leisure time on their hands—this is the United States of America, in the year 2046.

NATIONAL AFFAIRS

Last week the President returned to the Capital from our new 50th State—Iush and semi-tropic

Alaska. At Nome, President Roy F. Roosevelt had sworn in the new Alaska Governor, Francis C. Mitchell—his former pupil—when Roosevelt was still a nuclear research professor at Princeton. The President, having made a three-day tour of the newest State, was acclaimed by 22 million cheering and vociferous Alaskans. There he saw many of the two thousand weather-control atomtowers that bring perpetual sunshine and warmth to that State. There too, he tasted new, exotic superfruits now destined for world-wide distribution: stoneless plums as large as oranges, huge grapes with mango flavor, strasberries (cross of strawberry and raspberry) two inches long, and dozens of others.

In Alaska the President opened the sumptuous new classic State Capitol at Fairbanks, the first in the United States wholly built of solid, 14-karat gold and platinum blocks transmuted from Alaskan raw materials, thanks to atomiracles.

Yet the President was plainly perturbed in spite of the present greatness and richness of the United States, its power and prestige. His second term, just starting, is likely to be turbulent. Facing a 60% *Scientific Party* Congress, openly hostile to halmy Iceland's World Government President, Roosevelt realizes that a serious break must come sooner or later.

The C-War, now in its second year, has not improved the situation—indeed, 2046 will be worse. Certain Asiatic peoples are still undermining the

atomanager and industrialized (these conditions did not exist in 1979). (See *C-War*, page 36.)

The United States, which suffers great hardships because of such unfair practices, is prepared to use "certain new discoveries and processes," which may seriously upset "world conditions," unless the demands of the United States are granted soon.

Sensational? Yes. An ultimatum? Perhaps. World aghast? Certainly. But Roy Roosevelt, who never bluffs, is still the great atomatimet—*and the United States still has the best scientists in the world, despite all past and present "kidnapings."*

Labor: Plea for Longer Hours

Last week, for the second time during the past twenty years, famed labor leader Francis O. Hanrahan, president of the *United Unions of America*, pleaded for longer working hours. U.S. workers now want a revision of the 20-hour Federal Labor Law of 2012. In a protracted session with Labor Secretary George C. Austin in Washington, Hanrahan asked for the return of a 30-hour or even a 35-hour week. U.U.A. workers have found out that the short work-week now endangers all workers as well as the country. They recognize that too much leisure time and play makes workers stale, thereby curtailing production a great deal. It seems that too many workers also operate retail stores and other business ventures on the side and thus have become indifferent to their jobs. (Statistics show that more than 70% of the side ventures fail, often bankrupting the owners, who become unfit for their old jobs, thereby causing a scarcity of good workers.) A return to a 30-hour or even a 35-hour work-week, with proportionate greater pay, would stop these nuisance side-businesses, thinks pious Hanrahan, who produced voluminous workers' surveys on the subject. (Hanrahan did not mention the unhealthy practice of many greedy workers who, taking both day and night jobs, often work 50 hours weekly.)

Secretary Austin is doubtful that Congress would change the present labor law soon. He pointed out that a longer work-week would inevitably—as before—cause overproduction with disastrous price-slashing, bankruptcies of manufacturers, and the old vicious economic cycle. The alternative is an amendment to the labor law making it unlawful for workers to engage in any spare-time business. Such an amendment, however, might be unconstitutional, think informed observers. Meanwhile the *National Chamber of Labor* will make a three-months study of the pros and cons of the entire subject.

Elation in Congress

Congress was greatly elated last week after listening to the President's speech from Fairbanks. His quasi-ultimatum directed at the Geopolis World Government would produce prompt results, think responsible leaders. With the present 100% Science Cabinet and a Scientific majority (Congress is roughly 60% *Scientific Party* and 40% *Demorepub Party*) it became increasingly clear that World President Antonius would have to listen to U.S. demands more interestedly this time.

Congress also noted with great satisfaction the end of the Canadian attempt to turn the North polar region into a semi-tropical territory by atomic heat. The American Science Commission, after an extensive survey, had pointed out that the melting of ice caps at the north and south poles would raise the world's ocean levels more than 100 feet and cause vast inundation of all coastal cities. That would ne-

IN 2046 years of ATOMICS

by HUGO GERNSBACK

(Illustrations by Frank R. Paul)

United States despite all countermeasures. The World Government, through Geopolis' Planet President Antonius, who is not sympathetic toward U.S. claims, may soon institute sanctions if the United States continues its present course.

President Roy Roosevelt is quite unworried about a hypothetical atomic war. The present C-War is bad enough; military wars are unlikely nowadays. At Fairbanks' Capitol he had succinctly stated America's International Policy:

Atomatimet Still

The U.S. insists on the end of the long Commercial (C) War.

The U.S. insists that certain Asiatics refrain from the current wholesale luring of American scientists and technicians from the United States by secret bribes, and gifts of women and palatial foreign homes, in direct violation of World Treaty of 1979.

The U.S. wants Geopolis World Government to stop the current insidious practice of many small countries: flooding Europe and Asia with counterfeit U.S. patented and trademarked goods—always of poorer quality than American articles.

The U.S. wants a new world treaty to replace the outdated one of 1979 because the entire world is now

essitate expenditures of many billions of dollars to build great sea-walls to prevent flooding of the world's coasts.

Exclusion

Congress, last week, once more went on record against admission of Orientals. The Senators who were polled showed no indication of favoring a revision of the quota despite pressure from many quarters. The United States will stand by its old treaties.

Deeper Ant-Hive in New York

Since private atocars were banned from New York City (and other large U. S. cities) in transportation reforms (see page 42) other new problems arose. Beginning next month, all of the city's vehicular tunnels under the North and East rivers, and Brooklyn, the Narrows, and Staten Island tubes will carry only truck freight traffic (passenger atocars have been banned from city tunnels since 2043). All atotaxis will be banned by next month too, because taxi traffic has dwindled to the vanishing point, passengers now preferring the vastly faster air-rocketaxis or interboro-airrocket-buses.

Manhattan is now engaged in putting the finishing touches to its vast 30-block-square underground freight-classification yards, 120 feet below New York's street surface. Trucks from all tunnels will converge here, loading and unloading all freight and produce. Thence all freight is distributed by atompowered freight-subways via lateral substreet-tunnels to its final destination (see illustration page 34).

THE INTERNATIONAL C-WAR

U.S. Has the Patent Edge

Now in its second year, the International C-War continues unabated. The new world survey as of October 1, 2045, shows that every civilized country, thanks to plentiful and cheap atompower, is now industrialized. Even Africa's Zulus will man 100% of their factories now being built, during the coming generation. All countries are now "have" countries, except with respect to foodstuffs, fruits, etc. Mountainous countries such as Switzerland, Nippon, etc., which are not 100% self-sustaining—must import grains, fruits, etc. Practically all other countries are prosperous and produce 100% of their own requirements.

(The World Treaty of 1979, stabilizing export commerce, reaffirmed, as its standard, the world-wide non-fluctuating *perma-dollar*. Wages became completely stabilized in all countries, abolishing slave, child and starvation labor, with the result that no nation, theoretically, has any advantage over other nations. Craftsmen and artisans still get top wages for their labor and handicraft work, as they always will. But later, mass-production flooding atomarkets in all countries brought serious new problems.)

Indispensable articles, as well as many luxury patented articles, are now in terrific demand. Thanks to the low present costs of transportation via atorocket (currently traveling to the antipodes in 1½ hours) vast export and import of goods is now customary between all countries. However, it will be remembered that patent-licensing between all foreign countries was made illegal by the treaty of 1979, thus encouraging export and import. To that effect patents are granted at present only to the nationals of their own country—never to foreigners.

Since all nations are completely industrialized,

only patented, handcraft articles, work, work, books, etc., are imported and exported. The countries excelling in these products naturally export most of them.

The United States, due to its native inventiveness, still has a vast patent edge over the rest of the world and consequently exports most. The United States, too, has the best automatic-robot-atom-electronic machines, which greatly lessen the costs of all articles produced and consequently increase the profits for manufacturers and the wages of workers as well.

But many other countries, notably those in Asia, lag far behind in ingenious machines, devices, processes, and patents. For several years now, by insidious secret bribes, several Asiatic powers have hired many expert American engineers and technicians, thus luring them abroad.

The Bait

Usually these foreign powers induce our men to leave America under the guise of building and equipping their new factories to produce new foreign patented articles. This procedure being customary and legal, with high wages involved, many highly qualified American top engineers went abroad. There the canny Asiatics gave them the use of luxurious mansions, proffered them beautiful young women and servants galore and systematically began to "absorb" the Americans, who, if young and unmarried, often stayed for good. The use of forbidden opium, and other vices finished them soon. Since no law was broken, the American Consuls were quite helpless.

Free Americans still go where they want to go. Thus during the past few years 4,200 brilliant young Americans were lost to the U.S.—worse yet, the exodus is now at an all-time high. The conspiracy of the Asiatics aims to neutralize idea-rich America by getting their hands on as many idea-producing Americans as possible, at any cost. This scheme is devastatingly effective. So simple!

Cloak and Dagger

Last week, at Aleppo, Syria, in true cloak-and-dagger style, three U.S.A. operators located a secret underground factory that had been counterfeiting popular U.S. Dunbar & Company's patent atomotor. This light, versatile portable motor, which needs no fuel for a year, is used for air-conditioning, ice-making, well-pumping, bicycle-driving, etc., and is in big demand in all hot countries. The Syrians made an excellent "Chinese" copy—but with low efficiency—of the U.S. model. They had illegally manufactured more than 750,000 motors valued at over nine million dollars.

As is the custom of foreigners in such circumstances, the Syria government, expressing its surprise and indignation, promised immediate prosecution of the offenders. Past experience indicates that the next entrepreneurs will be more careful—until caught by our agents.

New Land, Ho!

Thanks to atomics, many "have-not" countries soon will become "haves." The project with this object in view, which has been under way several years, will terminate successfully during the coming year.

The grandiose idea to enlarge the area of many countries by extensive land-reclamation originated with Grego Banshuck, Luxembourg long-nosed engineer.

The scheme is as simple as it is spectacular. As is well known, many countries having coastlines

also have shallow waters that extend hundreds of miles. For example, off England's east coast, jutting into the North Sea, there are thousands of square miles of shallow waters less than 20 fathoms deep (a fathom equals 6 feet). Of great importance is the fact that when age-long land is reclaimed, it becomes exceedingly fertile because, during its submersion for tens of thousands of years, rich mineral deposits were washed into the sea by all the rivers.

To reclaim land, inventor Banshuck uses a monstrous atomic transformation machine, which directly transmutes sea water into huge metal blocks, preferably bronze, measuring 15 feet high, 15 feet long, and 10 feet wide, and weighing more than 600 tons each. A huge specially designed mobile machine, which weighs more than 2,000,000 pounds is mounted on gigantic tractors like ancient war tanks (see illustration).

This machine, requiring the use of only four men, fabricates one metal block per hour. The tremendous heat liberated during the atomic transmutation process melts the metal in a special crucible. This is then cooled by sea water and refrigeration when the metal block is ready to be lifted by special cranes from the forming machine. The metal blocks also have special key-ways effectively fitting and locking them together like the pieces of a jig-saw design. Loaded on special scows, the blocks are taken to the site of the future sea wall and sunk near the beach. Here cranes lower the first blocks into the water to the ocean bed—often rock—where they rest securely, due to their great weight. Upon these metal blocks the sea wall is reared. Experience has taught that labor and other costs do not warrant such construction deeper than 25 fathoms (150 feet). In such a depth, a vertical tier consists of 10 blocks, each 15 feet high, plus 2 more blocks extending above sea level. Such a sea wall keeps out the highest tidal waves. Special metallic cements are used between the blocks to make the finished sea wall water-tight as well as seepage-proof. The huge completed interlocking structure, about one mile wide (thick) and able to withstand the worst tidal waves, is indestructible. The configuration of the new sea wall naturally depends upon the contour of the 25-fathom limit, which the sea wall must follow closely. Greater depths must be avoided.

Britannia Chases Waves

England is among the most favored nations for the new atomic land reclamation (see map). Her

astounding new land area now jutting eastward far into the North Sea increases her geographical area almost 60%. The British sea wall will be completed by the end of next year. Only 15,000 men are employed in the construction of this atomic-produced metal sea wall, at a cost of less than two billion pounds sterling—an insignificant price for such a vast and important national undertaking. The pumping out of the water and the final drainage of the new—mainly agricultural—land will require several years. England, henceforth growing all her necessary footstuffs now imported, will be self-sustaining.

Denmark, Allemania, Holland, Belgium, France (with Denmark predominating) will also greatly benefit from the extensive land reclamation (see map). These low countries face the shallow North Sea and the English Channel. Denmark will add 70% new territory. Belgium will get 20% new land. Note: The narrows of the new English Channel remain the same width as before, but the channel will be many times longer.

It should be realized that reclamation of land by construction of atomic sea walls is not practical for all maritime countries. Nippon, for instance, is particularly unfavored for such reclamation because of the great ocean depths—hundreds of fathoms—directly adjoining the Nipponese islands.

The southern United States on the other hand is favored for new land reclamation (see map). Congress will have to decide regarding this future reclamation. The most favored state is Florida, to which could be added 30% new land for fruit (particularly citrus) growing.

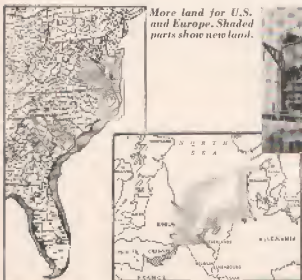
The eastern U.S.A., from New York City to Maine, is unsuitable for atomade land reclamation because of the great ocean depth over most of the prehistoric Atlantic Shelf.

How will rivers flow into the sea? Through levees (river dams), thence through suitable openings in the sea wall. A similar method was successfully used by the Dutch more than one hundred years ago when they dried up the inland Zuyder Zee.

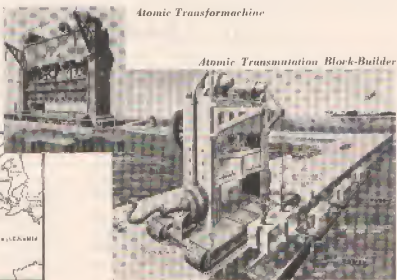
TRENDS

Odor-Music

Last week the world-famed ballet dancer, Russa Tania Paralova, took blasé New York by storm. At the handsome Gold-Plastic-Quartz Music Center, Moscow's curvacious top-ranking ballerina performed, on her push-buttoned dais, an exceedingly intricate



More land for U.S. and Europe. Shaded parts show new land.



Atomic Transformachine

Atomic Transmutation Block-Building



Parolova

(Museum of
Modern Art)



American
Miner's Family

ballet set to music and odor by the veteran choreodographer, Vasilli Valantchine.

Her most sensational dance is known as *Fleurs en Tempête* (Flowers in the Storm). As we watch, beautiful Parolova starts the ballet slowly, carrying a huge bouquet in her dainty arms. The tempo accelerates and the flowers are carried away by the storm. Simultaneously the sure-footed dancer, by touching various buttons on the dais with her toes, releases floral odors via the versatile house air-conditioning system: immediately through fine exhaust pipes attached to the backs of orchestra seats, the odors permeate the air and audience. The scents often change as the dais buttons are activated by Parolova's twinkle-toes. The supreme finale is reached when she mentally sings over her *Telepathrad* in her native Russian, the audience clearly hearing her vibrant notes (see illustration).

What Started It

Sixty-four years ago, the illustrious, ascetic Nobel-prizewinner, Kurt von der Heide, introduced atomic hair-elimination to the world (see page 41). He was the first to use *stratonium-B* as a universal depilatory. A few years later he saw all the races adopt its use. In the semi-tropical modern world, head hair is now an anachronism—its presence is a rarity; only eyelashes and eyebrows remain as a reminder of our prehistoric past. Only oldsters still remember man's unsanitary hairerops, daudruff, etc.

Last week, Manhattanite Kurt von der Heide celebrated his 90th birthday. Reporters calling on the famous, erect and tallish scientist asked what originally started him on his universal hair elimination. In a high falsetto voice the inventor explained that hot weather always caused profuse head perspiration, the result of which was that he often caught colds. (That was before the discovery, in 1970, of a specific cold cure (see page 39). One day on a visit to the famed Museum of Modern Art in New York he saw Minna Harkavy's bronze (1931) (see illustration). Struck with the classic beauty of the bald family, the highly impressionable 21-year-old von der Heide bought a ten-inch *plastomet* (old-time plastic-metal substance, no longer used) replica in an art store. A few months later he returned to his native Berlin. By that time he had firmly determined to become a world authority on depilation (hair removal). In his laboratory he set up the statue as a constant inspiration. Success finally came to him when he discovered *stratonium-B* in 1932. A few years later he returned to the U.S. to start a company for its exploitation.

"Throwback"

Eleanor Fairbanks ("Throwback") Patterson, the much publicized "Goldilocks" wife of Howard (Playboy) Patterson 2nd, obtained her final divorce papers in a Chicago court last week. Said her husband: "Eleanor deceived me into believing that she was hairless like all other normal women. But in fact she had never used an atomic permanent depilatory, but shaved until we were actually married. Then she sprung those ridiculous throwback locks on me, making me the laughing stock of the country." Said she: "Fiddle-faddle! He liked my gorgeous blond hair, but he couldn't stand his friends' jokes."

100 YEARS OF ATOMICS

This year, 2046 A.D., marks the centennial of the Atomic Age. Accordingly, we present in this issue the most important basic milestones of atomiceutry discoveries and applications thereof in chronological order.

1958. Dr. C. N. Pierce, of Harvard University, demonstrates the first experimental *ATOMOBILE* run on atomic energy. He also used the first plutonium atomicroturbine.

1959. The *Queen Elizabeth*, the first ocean liner to use *ATOBOILERS*, crosses the Atlantic Ocean in 2 days and 15½ hours.

The New York Central Railroad, using small, compact tubular boilers activated by atomic heat, is the first to adopt atomic power on all long-distance through trains. The cost of atomic power is a small fraction of the cost of coal or oil fuel.

1960. Professor Andrew Lodge, prominent Berkeley Calitechnician, discovers the first basic *ATOMIC BATTERY*, called *atobat*, whereby plutonium-C generates electric current in vast quantities at infinitesimal cost. The finger-sized *atobat* produces 10,000 kilowatt-hours of electricity for less than one-tenth of a cent.

1961. Gaston Michaud, Paris Sorbonne, Nobel-prizewinner and world-renowned atomician, *SYNTHESIZES PRECIOUS METALS*—such as gold, silver, platinum, etc. Michaud, the modern alchemist wizard, uses steel, copper, mercury, and lead in transmuting many base

metals into precious ones. By the end of 1962 gold and platinum sell at only 12 cents a pound.

1964. The production of atomade artificial gold and precious metals on a vast scale causes a brief, worldwide financial panic. The United Nations, now comprising 85% of the world's nations, hurriedly adopt real estate and other stable property as the legal universal world money base.

A new non-fluctuating PERMA-DOLLAR is adopted as the money-unit for the entire world. All banks now issue *dollar-realnotes* against tangible property. This constitutes the new money-base. An international commission constantly checks all banks of the United Nations to insure the stability of the world perma-dollar.

1965. The U.S. Army shoots the first ATOMIC-POWERED ROCKET, carrying six observers, from Hawaii to California. The time of the 2,400-mile flight was 29 minutes. The rocket, at its highest point during the flight, rose to 550 miles above the Earth's surface. Telescoping expanding wings enable the pilot to glide the rocket to a smooth landing at an airport.

1966. CANCER CONQUERED by *telenium-B* radiation. The radioactivity of the new element *telenium*, discovered by Doctors C. B. Paul and M. Hanchez, of Columbia University, New York City, is harmless to all tissue except that of malignant cancer. Paralleling the triumphs of penicillin—which kills germs but is harmless to man—*telenium-B* is injected once a year into the human bloodstream. Such treatment is now obligatory in the United States, as was vaccination in former years. Practically no cancer deaths have occurred in the United States since 1966. The few freak cancer cases that did occur were due to improper injection methods.

1967. Alfred Henry Smith 3rd, Trenton, N. J., atommechanician, invents the first practical lightweight ATOM-REACTION ENGINE. With an atomotor strapped to his back, Smith flies non-stop from Trenton to Chicago in 2 hours and 15 minutes. Steering is accomplished by moving the swiveling engines by means of hand-controls to the right, to the left, or up or down.

1968. The United States Post Office Department is first to adopt ATOMAIL. By the use of a newly developed, efficient ATOMOTOR, self-powered and manless, magnesium-alloy projectiles, each carrying 1,000 pounds of mail, and automatically guided by radar, are shot 250 miles above the atmosphere from special post-office *atomailports*. Arriving over the destination-atomailport, the projectile begins its vertical descent. Parachute-like wings now open automatically around the projectile which then falls at reduced speed into a huge steel net. The time in transit for atomail from New York City to San Francisco is 37 minutes.

1969. United States houses, factories, and office buildings adopt low-cost ATOMIC CENTRAL HEATING, lighting, and air-conditioning. These small, compact, light atomic plants are now mass-produced. The cost of the plant is as low as \$200 for a six-room house. The total cost of the fuel for light, heat, and air-conditioning (which excludes servicing) is about three dollars a year.

In order to meet this competition, the electric power companies (they themselves now use atomic power to generate electric current) sell 100 kilowatt-hours of electricity for from 1/5 cent to 1/2 cent to home owners, and to factories at a still lower price. (In 1945 the cost was 10 cents for a single kilowatt-hour.)

1969. The Department of Agriculture completes its long-heralded U. S. WEATHER CONTROL by atom-

power. More than 3,800 tungsteel towers, each 500 feet tall, now dot the U.S.A. They are never more than 50 miles apart. Periodically during the day these towers eject neptunium-F rockets into the lower stratosphere, where they explode into "heat-suns" and heat the air over many square miles with an intensity a thousand times that of the sun. This heating of the entire countryside assures several crops yearly. The direction of the wind is regulated by correctly timing the rockets "in sweeps," or relays. The year 1969 gave to the entire northern part of the United States a continuous mild climate like that of Southern California. Excepting on high isolated mountain peaks, there has been no snow or ice in America since 1969. Special atomtowers surrounding all cities also control rain, allowing rainfall at night only. *Neptunium-F* does not give off dangerous radiation.

1970. Doctors Paul and Hanchez, of Columbia University, famed discoverers of present-day cancer cure, announce a specific COMMON COLD CURE. Noting that their anti-cancer *telenium-B* lessened colds considerably, these doctors found that by changing *telenium-B* into *telenium-B*-isotope, the anti-cancer injections remained as effective as before, but that the cold-bearing *virusions* were exterminated. *Telenium* radiations, which continue active for more than a year, give a treated person complete cold-immunity during that period. Because *telenium* injections are now obligatory yearly, the United States has been cold-free since 1971—thanks to modern atomagic.

1972. The first atom-powered rocket space flyer makes a ROUND TRIP TO THE MOON. Developed by the General Atomic Company in a three-year research, the 750,000-pound rocket, carrying twelve atomicians and six well-known scientists, took off from a specially built skyport near Buffalo, at noon, September 10, and landed on the moon, 250,000 miles distant, at 1 p.m., Eastern Standard Time, September 14. The total elapsed time was 97 hours. Wearing spacesuits especially made for use on the airless moon, the scientists explored the moon for three (Earth) days, during which time they maintained continuous contact by short-wave radio with the Earth, where broadcasts and television programs extolling the wonders of the moon were seen and heard by hundreds of millions. The return trip required only 73 hours (3 days) because of the greater gravitational attraction of the Earth. The space rocket landed at the skyport at 1 p.m., E.S.T. September 20. Fears, expressed by ancient writers of science-fiction, that meteoroids speeding through space would pierce any moon rocket and riddle the flyer like a sieve, proved unfounded. They hadn't thought of radar in those days! Automatic radar-control changed the direction of the flying rocket, which thus sidestepped all deadly meteoroids. Not one, larger than a sand grain, was intercepted in the historic moon-flight!

Dr. John B. Curtis, of Yale University, head of the moon rocket's science staff, planted an American flag on the moon, on September 15, making it United States territory. Modern atomic transmutation having made mineral wealth obsolete, the airless moon has little economic value today. (Its chief uses are for astronomical purposes and for radio and television broadcasts.) *Lunology* (science of the moon's structure—counterpart of geology) and lunar exploration are now in the domain of that branch of science.

1975. WORLD WAR IV, long expected, burst suddenly upon humanity. India, one of the sore spots of Asia, called for a holy war against the Western World. Choleric Chandra Nehru, the fanatic nationalist India leader, succeeded in secretly arming several million

Indians who were ready to war on the rest of the world. Favored by their large uranium and other vital atometal deposits, India's scientists controlled vast amounts of atomic power. Through easy modern transmutation processes, iron and other abundant ores could be quickly transmuted into new war metals.

(It became known later that secret underground factories, in remote locations, for several years had been producing new top-secret war implements. As the atomic power, used for general factory production gives off no smoke, United Nations intelligence men learned of the impending attack too late. The newly manufactured war weapons were stored underground beyond the reach of the expected, most powerful enemy, atombombs. Allied with India were Afghanistan, Tibet (a country rich in uranium), Nepal, Burma, Siam, Indo-China, and Indonesia. All these countries had been secretly supplied with weapons sent by radar-steered rocket supply ships launched from a remote Himalaya mountain fastness. The rockets descended at night into jungle regions of Indian allied countries unfrequented by white men. During World War IV more than 900,000,000 Asiatics were arrayed against the Western World.)

Remembering the devastation of Germany in World War II, Chandra Nehru wisely refrained from violating the *World Safety Atomic Treaty* of 1958, which outlawed the use of the atomic bomb for war purposes. In his historic war declaration he said: "As World War II respected the treaty against the use of poison gases, and as World War III respected the treaty against the use of the atomic bomb too—we won't use it unless our opponents do!" The really outstanding fact of World War IV was that neither side used a true atomic bomb—this gives a bright outlook for the future of the human race.

But because of the use of atomic power, World War IV was vastly more frightful than World War III. Huge atomic rocket-propelled projectiles, steered by radar and television, were far more effective in warfare than anything that was ever known before. On a peaceful Sunday morning the Western World suddenly became aware of the beginning of World War IV. Long-distance rockets bombarded London, Paris, New York, and Moscow, and killed more than 600,000 persons the first day.

Having expected war from unknown quarters for some time, the Western Powers were not unprepared.

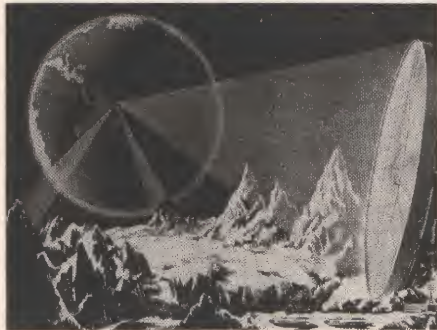
After the first onslaught, vigorous countermeasures proved effective in part. Radar search guns located most of the projectiles in flight and exploded them ahead of their targets. Yet those that landed—each carrying 100 tons of powerful explosives—caused great devastation. In New York City, during the first week, more than 120,000 houses were demolished and 200,000 casualties occurred.

The Western Powers retaliated with larger rocket-bombs which killed millions of Asiatics. In the third week of the war Nehru introduced his frightful new *RADIATION BOMB* to a horrified world. This tiny bomb, weighing only a few pounds and deathly beyond imagination, could not be intercepted by the use of radar, new magneto-field detectors, or electronic flight-missile deviators—they were too small a target.

(These bombs, exploding over cities, showered them with expanding radioactive emanation which saturated the air with heavy supercharged atoms. Without warning, or audible explosion, the silent approach of death was totally unheralded. Those who breathed the radioactive air died almost instantly. Thousands of others died of frightful burns. Even those persons miles away from the bursting radiation bombs died of pernicious anemia weeks later. Six of these lethal bombs caused 420,000 deaths and casualties in Philadelphia alone.)

The end of the war came dramatically six weeks after its start. On the principle of World Wars II and III—to defeat the enemy by breaking his will and ability to make war—the capable U.S. General Martin P. McMurdock, the titular head of the Western Powers' forces, had prepared for such an occasion.

The exact locations of the Asiatic bomb-launching sites having been ascertained by radar triangulation, the Western Powers simultaneously bombarded these sites by concentrated rocket barrage—the most devastating fury ever seen on the earth. About a half million 300-ton *SUN-BOMBS* were thrown against the enemy in a continuous two-day bombardment. The sun bombs contain a mixture of several powdered new isotope metals and a secret new heavy-atom oil. When these bombs strike, instantaneous disintegration of the powder-and-oil mixture causes a *burst many times hotter than the heat of the sun*. As a result of this atomic heat, over a square mile of the Earth's surface in the region of the bomb-struck area turned into molten lava. Penetrating through 800 feet of rock,



World War IV's Secret Weapon: monstrous 2-mile moon mirrors which disintegrated Asian city, Hyderabad

the incandescent lava flooded any and all underground war plants and vaporized them instantly. *The lava was so hot that no man could venture within half a mile of the bomb-struck area for weeks.* After this memorable saturation bombardment with sun-bombs, the number of Asiatic rockets diminished abruptly.

World War IV quickly ended after the use of the war's greatest hush-hush secret weapon—Colonel James O. McIntyre's MONSTER MOON MIRRORS. The war's *coup de grace* was dealt from United States territory—the moon. During the preceding year Army men had worked feverishly to construct these huge super-mirrors—each two miles in diameter. The mirrors were located at eight strategic points near gigantic mountains on the moon. Constructed of super-light lithium, the world's lightest metal, weighing about one-third as much as aluminum, the mirrors were built up of thousands of separate metal facets each three yards square. The front of each lithium facet was covered with a layer of pure burnished silver. As the moon is airless, the silver never tarnishes. By remote electromagnetic control the thousands of facets can be moved so as to reflect the sun's rays with maximum efficiency. These lunar mirrors were ready for use five weeks after the start of the war.

By radio, Chandra Nehru was notified to evacuate Hyderabad (India's fourth city), within twenty-four hours; he was warned that the city was doomed to destruction. At the zero hour three of the eight moon mirrors were focused on Hyderabad. Suddenly the sun's concentrated heat rays—as if directed from three mammoth burning-glasses—struck the luckless city and created a holocaust, vaporizing every building and every living thing. Sixty thousand persons (one-tenth of the city's population), unwilling or unable to leave the city, perished. Nehru finally consented to unconditional surrender. World War IV ended six weeks after it started; cost in human lives: 3½ million killed; the number of casualties 14 million. It was the last war for two generations.

1977. With a view to preventing wars, the world's countries, through the United Nations, finally agreed on a real WORLD GOVERNMENT. A Planet President with full powers to arbitrate all political-international questions and differences is elected every five years. On the southern tip of Greenland—now semitropical, thanks to atomarvels—there was created a new World State, very easily accessible by air for most of the world's population. Here in the extraordinary new capital, *Geopolis*, hundreds of handsome government buildings and all United Nations' embassies were built. The efficiency and power of the World Government grew tremendous. The world has experienced 68 years of peace to date.

1982. Man's 4,000-year-old desire to ELIMINATE SUPERFLUOUS HAIRGROWTH was finally gratified. The ancient Babylonians were probably the first to use depilatories (for removing hair). But for thousands of years women still shaved their legs while men continued shaving their faces. Then after many years of toil, Alemania's Kurt von der Heide discovered that one application of the new element *stratonium-B* would permanently kill the hair-bulb follicles and thereby destroy subsequent hairgrowth. Secondary new downy hair is destroyed at the root by a second application of benign (not harmful) radioactive stratonium-B. For esthetic and sanitary reasons, most people now remove all head hair. The present-day world-wide hairless mode in old and young (of both sexes) would doubtless shock former generations, but it is here to stay (see also page 38).

1987. The whole world adopts CIVILIAN IDENTIFICA-

TION INSIGNIA, which are somewhat similar in appearance to military insignia. Atomic (military) dangers require instant identification of every person anywhere in the world. The insignia also greatly simplifies more efficient supervision by the secret-service personnel. Most individuals, too, want others to know *what* their position is. This simple insignia is usually worn on the right side of the chest by both sexes. A glance reveals whether the person is a manual worker, a white-collar worker, an artist, an official, an entertainer, a student, an engineer, a judge, or a senator, etc. Vertical color bars indicate the years of service (see cut). Wearing false insignia is punishable by ten years imprisonment.



1991. In England, Dr. Winston Burroughs is the first to demonstrate *Radiofluoractivity* (RAFLA), combining fluorescence and radioactivity. (In 1902 Professor Pierre Curie, co-discoverer of radium, had built the first RADIUM LAMP, made of two six-inch diameter glass bulbs, connected by a horizontal glass tube. One tube contained a solution of radium salts, while the other tube contained phosphorescent zinc sulphide. When a glass stopcock in the horizontal glass tube was turned, the radium emanation brilliantly lighted the sulphide crystals. But the high cost of radium made the use of those early radium lamps impractical, except for scientific demonstrations. When atomic energy became universally available, *radioactive lamps* appeared. The first of these lamps were night-lights, for dark hallways, etc. Such lamps however lacked the brilliance and necessary light power needed for general use; also, the internal electronic bombardment darkened the glass after a few years of use.) Dr. Burroughs' fused quartzite bulb is coated inside with *plutonium-fluoride-B*. One end of the bulb contains tellurium radioactive salts which give off a powerful emanation. The lamp lights brilliantly when the flap-valve which closes off the tellurium salts is opened, thereby freeing the emanation. The RAFLA lamps cost nothing whatsoever to operate, *they use up nothing*, and, according to size, give an illumination of from 25 to 5,000 standard light-units. Furthermore they last indefinitely.

1996. Dr. Frank Capek, famed cytologist (one having a knowledge of the structure and function of cells), of Prague University, discovers SEX DETERMINATION for humans. His positive method now enables parents to beget either boys or girls as they desire. The sex of the offspring is always determined by the male sperm; the female ovum (egg) is always neutral. The Y-chromosome in the animal and human sperm invariably produces males; the X-chromosome always produces females. These facts had been well known and studied for over one hundred years. (Chromosomes are derived from both parents and carry the *genes* that determine heredity.) Dr. Capek irradiates the human male gonads (testicles) four minutes with benign *proto-electrum* Gamma rays. These rays neutralize the Y-chromosomes for two weeks, and the result is female offspring *only*. For male offspring, Dr. Capek irradiates the gonads with *proto-electrum* Beta rays and thereby neutralizes the X-chromosomes for three weeks. Totally unjustified was the age-old fear that, with the final discovery of sex-determination, all parents would desire only boys. After forty years experience with the Capek method, the population is still 50 percent males and 50 percent females. But parents *do* want a boy as their *first-born* child!

2000. Drs. John Hogarth and Walter Sidney, of the United States Department of Agriculture, discover and soon demonstrate commercial **SYNTHETIC MEAT, MILK**, etc. Man no longer eats beef, which requires that slaughter-animals eat great quantities of grass for meat production. Instead we now eat grass, hay, straw, etc., after it has been transmuted atomically, in curing vats, into all varieties of synthetic meat, which is more agreeable to the taste and more healthful than natural meats. In the modern four-day process, meat fibers *actually grow* like natural ones. Many new and formerly unknown types of meat are now produced routinely all over the world. More important, diseases such as trichinosis, which once was universally rampant when mankind ate uncooked or unprocessed pork, are unthinkable nowadays. While we have dozens of pork types—all of which can be eaten uncooked—there has not been a single case of trichinosis in 40 years. Milk is synthetically made by methods similar to those used for meat production. The cost of the synthetic beef and milk is one-fourth of the cost of natural beef and milk.

2008. World-wide **DESERT IRRIGATION**, using "transformed" sea water, becomes a reality. Gustave Duchanel, Algiers atomician, is building dozens of huge canals, through which water from the Mediterranean Sea now flows into the arid Sahara Desert. Economic atomic super-heat, used in constructing these canals, melts the desert sands and ground into a waterproof glass-like lava. Along the finished canals there are stationed hundreds of atomic-chemical "transformers" which convert the sea water into naturally pure water. Within ten years the arid Sahara Desert has become a fertile garden region supplying most of Europe with produce, tropical fruits, wines and a superabundance of flowers. Similar Duchanel projects produce gratifying results.

2014. Dr. Irving Schiwarz, famed electro-biologist, of Harvard University, invents **RADIO-TELEPATHY**, combining *telepathy* (mind communication), the *encephalograph* (an electric instrument registering brain currents), and the radio into the one instrument called *telepathrad*. (Telepathy was demonstrated nearly one hundred years ago by Professor S. B. Rhine at Duke University. The *encephalograph* is even older.)

Strapped on the forehead, the *telepathrad* is a 2½-inch round instrument containing a supersensitive radio and amplifier which transmits and receives the telepathic messages. A newly invented electronic tube—the heart of the *telepathrad*—operates on a near-optical wavelength. It modulates man's thought-pulses, and then transmits them through space; its range is thirty miles. The instrument is energized by a miniature atombattery. New *ultra-pulsator* circuit prevents the reception of unauthorized messages. Secret transmission and reception of thought communication is therefore established.

2021. **INFECTIOUS DISEASES END**, Professor Vladimir Petroff, of Chicago Medico-Research, announces. Paralleling the cancer-elimination treatment discovered in 1966 by Drs. Paul and Hanchez, Professor Petroff injects benign *Americium-emanation* (discovered by him in 2008) into a newborn child's bloodstream. This injection gives a six-year immunization against all man's plagues, such as cholera, typhus, tuberculosis, influenza, and other infectious diseases. A new injection, however, is required six years later. Planet-wide treatment in all countries becomes obligatory by 2028.

2030. Dr. Martinez Heerahn, famed woman electro-culturist, of Santos Foundation, **BOOSTS CROP YIELDS**

200 to 300 percent. During the past century, crops were increased more than 100 percent by the use of DDT and radioactive emanation sprays which, however, reached neither roots nor harmful underground larvae and insects, nor burrowing animals such as moles, etc. Sub-soil vegetables—potatoes, beets, turnips, etc.—also were unprotected by old-fashioned sprays. Dr. Heerahn now deeply impregnates the soil with a powerful radioactive bombardment. A combination of new radioactive elements completely exterminates every living thing down to seven feet below the ground surface, including eggs, larvae, etc. Thirty days later the bombarded radioactivity has combined chemically with the soil and has highly enriched it. The pest-free soil is then ready for planting or seeding. The radioactive bombarding is done by radio-controlled, hovering aircraft.

2040. The first **ROUND-TRIP TO VENUS**—the nearest of our planets—by Americans is accomplished. Using the knowledge that had been acquired in flights through space to the moon, the General Atomic Company builds a monster atomrocket, *Venus 1*, weighing more than 2,000,000 pounds. Average speed is 7 miles per second. The 52-million-mile round trip takes 88 days, including 2 days on Venus. A longer stay on Venus is wholly impractical because, as the two planets draw apart from each other, in their respective orbits the distance between them increases rapidly. A party of fourteen scientists finds that Venus is unsuitable for human habitation because: (1) The air pressure—half that of the Earth—is suffocating for humans. (2) The excessive proportion of carbon dioxide (carbonic-acid gas) in the atmosphere of Venus is unfavorable to the survival of air-breathing Earth-dwelling human beings. (3) Venus is still in its mid-cooling stage, the temperature of its atmosphere at sea-level being above 140 degrees Fahrenheit. (4) Venus is much closer to the sun than the Earth. Venus is 67 million miles from sun; the Earth is 92 million miles (mean) from the sun. Therefore it will not have normal terrestrial living conditions—similar to those that prevail on the Earth—for 35 to 50 million years. Dinosaur-like creatures and other swamp animals resembling those that lived on the Earth in prehistoric times were widely observed. The Venus-discoverer scientists strongly recommended an early trip to 50-million-mile-distant Mars (over 100-million-mile round trip).

2044. **CITY TRANSPORTATION PROBLEMS SOLVED**. After thoughtful planning for decades, city traffic snarls, bothersome for 150 years, are completely eliminated. Eminently successful results have been achieved since the inauguration of the present regulations and sane provisions for traffic:

(1) Two-level passenger subways throughout, the lower level reserved for long-distance travel and the upper level for short-haul service.

(2) Freight subways running under center of blocks with side tunnels connecting all buildings. No freight is now allowed on street surfaces.

(3) The only vehicles permitted on streets are *atobikes*, *atoskates*, and registered *atotaxis*. (All two-wheeled gyro-controlled vehicles are for single passengers; the three-wheeled or four-wheeled vehicles carry from two to six persons.) Private *atocars* and *atomousines* are permitted outside of the city limits only; they can never enter the city proper.

(4) The majority of persons now travel by air; they usually take *airocketaxis* from an airport to the city's myriad roof-landing decks. Thence they take the ten-cent-fare municipal *airautobus* to other parts of the city, or elevator to the street. +

While science-fiction has achieved its greatest popularity in the United States, it is by no means limited to the North American continent. Almost every advanced nation has an audience receptive to this literary type. Most of the finest British science-fiction stories do appear in this country, but though many foreign nations, particularly France and Germany, publish appreciable quantities of science-fiction, little has been translated. The editor of SCIENCE-FICTION+ has read many of these novels and has chosen one of the best and most recent ones by two outstanding French novelists to be translated for the American audience. In addition to the different flavor of the writing, the first chapter of this story is complete in itself.



"... all three locks were released in the same hundred-thousandth of a second!"

The **STOLEN** MINUTE

by PIERRE DEVAUX
and H. G. VIOT

(Translated from the French by Sabine and Leonard J. Wang)

LIKE A TERRIFIC CANNON blast the explosion shook the bodies of the travelers stretched out on the ground; a burning light seared their eyes, a high wind swept across the closely cropped grass of the airport. Chunks of earth and broken stones poured down from a thick cloud of dust and smoke. Everyone covered his head. Then, only the distant falling of broken glass pierced the sudden silence.

The airport personnel obeyed their orders with lightning speed. The fire engine dashed from its hangar, two ambulances drove onto the field. Dozens of men came running from the nearby buildings.

Only a somber black cloud, which the wind had unraveled, hovered low in the sky.

"There's no more danger!" a stewardess shouted. "Be calm! . . . Lean on me, Madam . . . It's nothing. No one is hurt . . ."

"What happened?" someone asked.

No one answered. Who could have answered? Who would have dared answer?

The smoke completely disappeared, and they could see, about 150 feet from the edge of the concrete runway, an enormous black hole in the green grass.

All those who, a second or two before the explosion,

(Illustrations by Jay Landau)



H. G. Fiot
School Inspector of
Paris, France. Special
collaborator of the
Parisien, large circula-
tion Paris news-
paper. Author of nu-
merous books of the
world of tomorrow.



Pierre Deraux
Outstanding and well-
known French
science-fiction author.
Pierre Deraux
has written numerous
science-fiction novels,
the present one being
the first to be trans-
lated into English.
He is the director
of collections for the
French Youth, and a
prominent engineer of
the Ecole Polytech-
nique of Paris. He
is secretary of the
Groupe X-Amérique.

had obeyed the sharp command and had thrown themselves flat on the ground, now got up, shook out their clothes, and picked up their bags, their briefcases, or their coats, with trembling hands. Weak smiles broke out on their faces—smiles that sought to excuse the fearful and grotesque postures that terror makes humans assume. An ear-splitting voice, a nightmarish voice had sounded the alarm and everyone had obeyed with a speed and above all with a willingness that the bravest among them vainly tried to explain to themselves.

First, the dull thud of a metallic door which had been closed with such violence that the enormous plane, which was to fly to Nice a few minutes later, had been completely shaken. From the fuselage of the *Languedoc* a dark mass had shot out, had circled the plane, and had veered toward the center of the field with the speed of a meteor. The travelers, who had been brushed by the strange projectile, had heard a violent whistling sound. All those who were supposed to take their places in the plane and all those who accompanied them had seen, a fraction of a second later, the frightening apparition transform itself into a green blotch which, cutting through the air, shot toward the sun, only to fall once more.

A moment later strong winds caused by the explosion had passed over the stretched-out bodies.

An inquest followed. It did not produce satisfactory results. An article appeared, that same day in *LUTÈCE—SOIR*:

MYSTERIOUS CRIME AT LE BOURGET

Possible attempt on life of the Consul of Transylvania and chemist Marandon.

At 2:00 p.m. at the airport the enormous *Languedoc*, the 2:20 p.m. daily for Nice, moved forward and turned around until its side faced the airport's long buildings. The passengers were ready to climb the steps which lead into the fuselage when the plane was shaken by a violent shock. All the witnesses could affirm, a few minutes later, that they had seen a blurred mass shoot out of the side of the plane, keep clear of the left wing, veer with lightning speed toward the ground, then rise, circle around, and finally fall down about 180 feet away. At the same instant a loud peremptory shout rang out: "Lie down! Everything is going to blow up!"

Fortunately, they all obeyed. For at the very spot where the mysterious object had hit the ground, there arose immediately a column of fire and smoke accompanied by a deafening explosion.

No passenger could give a precise description of the strange bomb.

The departure of the *Languedoc* was delayed for one hour. Mechanics, radio operators, and specialists of all sorts examined it with the

most scrupulous care. They discovered nothing to justify an order to keep it on the ground.

The commanding officer examined the list of passengers, a list which included the name of M. Francisco Carral, the Transylvanian consul at Algiers, that of Dr. Jules Marandon, the well known chemist, and that of M. Claude Noroy, Professor at the Collège de France.

Messrs. Marandon and Noroy believe that they have no enemies. However, terrorists or political adversaries of M. Francisco Carral may have conspired to take his life. The investigation in progress will doubtless throw light on this subject.

In the plane which was bearing him toward Nice, the old chemist pondered and his nephew carefully observed him. Jean Thévenet was secretly writing his uncle's story. While the transport flew smoothly toward the Mediterranean, he repeated to himself the first sentences of his work.

"Jules Marandon, illustrious scientist, is creator of the flourishing "Neo-natural" perfume industry, one of the genuine glories of France. The man is tall and a little sad; he has a long face furrowed with deep wrinkles, closely cropped hair, and an aquiline nose. He is about sixty years old. On his left cheek he has a sickle-like scar, the memento of an explosion of a retort containing tetraethylchloromethylene at the Aigopal factory near Nice.

"When the headlines of the evening papers announce an interview with Marandon, the public snatches the sheets still wet with ink as if it were about Einstein! Marandon, everyone knows, makes governments and the great captains of industry tremble, because of his inexhaustible capacity to create new inventions and his naïveté concerning their impact on the world. One word from him—a formula consisting of five numbers—can devalue a prosperous industry, and reduce to zero stocks worth billions. A genius at invention, childlike in his innocence of their application.

"He, too, might have said, as Bell had replied to the British capitalists who hesitated to pay a fair price for his miraculous invention, the telephone: "If you are not satisfied, I will invent another!"

Jean Thévenet was right: as people breathe, as an apple tree bears apples, so Marandon discovered and invented! However, at this particular moment he was not able to find a satisfactory answer to one question: did someone want to kill him, to cause a catastrophe in order to get rid of him? No, he just couldn't believe that anyone might desire his death. Certainly, he was getting close to the end; he was going to begin the decisive experiments and soon. . . .

Evidently, his discovery was going to ruin some powerful concerns, and if the nature of his research were known. . . . Actually very few people knew what kind of work he was doing: his nephew and secretary Jean Thévenet, his laboratory assistants at Aigopal, Professor Noroy whom he had encountered by chance a little while ago at the airport, and finally Ludovic Sarlat who was working at Nice amid the greatest secrecy. He would not, he could not suspect any of his collaborators, who he believed to be discreet and trustworthy.

He needed only to look at the serious and honest face of Noroy sitting at his side to feel his fears vanish. Hadn't the professor tried to make him give up his trip by claiming that the weather wasn't good over the mountains of the Massif Central and that the reports from the weather bureau were pessimistic?

"My dear Noroy, you have interpreted the infor-

mation they gave you incorrectly," he said while glancing at the countryside slipping by beneath him. What a splendid day! What a beautiful April!

Noroy, a little embarrassed, stroked his short beard.

"To be frank, my good friend," he replied, "the weather hardly disturbs me. After the accident we escaped. I am afraid that we have more to worry about than a storm or a fog."

"Nonsense," Marandon retorted. "I know what you are thinking, but I am not as dangerous as one might suppose: I have still not reached my goal."

"Precisely," Noroy murmured.

In the center aisle the steward and the hostess came forward with cardboard boxes and distributed them to the passengers.

Jean Thévenet, sitting in front of Marandon, turned around.

"Take nothing, uncle. Remember your diet."

The robust old man gazed at the youthful face raised toward him and smiled.

"The doctors are mistaken, Jean. I don't have to watch my diet, and since no one can keep an eye on me now except you, I intend to do as I please!"

"But it's four o'clock," young Thévenet remarked.

"We scarcely had time to eat lunch, and emotional disturbances always give me an appetite. Don't worry about me. . . . Thank you, Miss."

And Marandon began to tear off the cover of the box which the stewardess had just offered him.

"Will you permit me?" Noroy then said.

The professor handed him, completely opened, the cardboard container which he had just received. At the same time he appropriated Marandon's.

"Thank you," said the chemist, "you are more dexterous than I am."

He contemplated with satisfaction the tomato, the egg with mayonnaise, the chicken wing, the banana, and the chocolate éclair which, along with a glass of wine and a cup of coffee, constituted his lunch.

"You aren't hungry, Noroy?" he asked, observing that the professor had not finished opening the box which he had taken from him.

"I'll eat in a little while. I don't feel very well right now."

However, the plane was pursuing its course without the slightest shaking.

"It is doubtless air-sickness," said Marandon. "It has never affected me. In the middle of the ocean, during the most violent storms, I have never suffered from seasickness."

He interrupted himself in order to lean over the shoulder of his nephew who also was not eating. On his unopened box he had placed a thick notebook in which he was making rapid notes.

"At Le Bourget airfield at 1:55 P.M. We meet Noroy by chance," Marandon read. "The professor claims that he is going to take a little rest on the Riviera. An attempt is made on our lives."

"What's this?" growled Marandon as he seized the notebook in order to read with greater ease. "What is this nonsense you're writing, my boy?"

"An attempt is made on our lives," he continued. "The inconceivable intervention of Providence. An inquest without results. We leave despite Noroy's advice at 3:20 p.m. Why did the professor want to make us give up our trip? Uncle Jules refuses to keep to his diet and will pay for it dearly."

"Objective, perspicacious, and witty," piped Marandon as he threw the notebook on the young man's lap. "My heavens, you're certainly a little arrogant, my boy. After all, are we such important people that someone would want to destroy us? And what are

you trying to insinuate concerning M. Noroy? Do you claim that he undertook his trip in order to follow us? What designs do you think he has? Pardon me, dear colleague, for revealing to you so brutally the thoughts of this young whippersnapper. Read for yourself what nonsense he plans to leave to posterity."

"I won't permit him to read it," snapped Jean Thévenet as he blushing thrust his notebook into his pocket.

The professor feigned indifference, and with his cardboard box under his arm, he made for the rear of the plane where he propped his elbows on the bar.

"Confounded beast!" Marandon murmured, but his nephew could not tell whether these words alluded to him, or Noroy, or to the roast chicken whose wing his uncle was devouring. . . .

Claude Noroy, professor of molecular physics at the Collège de France, was a rather unusual person. In spite of his short, pointed, blond goatee and his somewhat thin, reddish-blond hair—Noroy was fifty years old—the man gave a youthful appearance. He was the kind of academician who puts on his two-cornered hat and a uniform with red sashes for testimonial dinners.

Noroy, a government-employed scientist, had a personal fortune which made him independent and free to speak as he wished. He was rumored to have addressed the minister Brochat-Sauvignin thus: "You provide the money and we scientists will do the work!" When they refused him equipment he bought it with his own funds and did not forget to tell the press that he had done so!

Naturally Noroy made enemies; but despite his slender build, the man was a formidable adversary who enjoyed physical exertion and was a master of judo. Would-be saboteurs of the cyclotron once learned this the hard way without, however, incurring serious injuries, for a judo throw does not kill.

THE PLANE PASSED over the mouth of the Var river and then over the Nice airport. During the next few minutes it continued toward the sea, then veered to the left and nosed down in the direction of the city's castle. It touched the ground far from the hangars, rolled across the field, turned around with a thunderous noise, then taxied slowly by the hangars to the main gate, and stopped a few feet from the main road.

Jules Marandon was one of the first to file through the narrow door of the fuselage. He stumbled heavily down the steps and waited at the bottom for his secretary. Jean Thévenet had not assembled all his hand baggage. The light jolt of the landing had made one of his leather briefcases slip from his lap, and he no longer knew what he had done with his camera. After a brief delay, he found it in the very spot where he had left it: under his thick memorandum book in his small suitcase. He was the last to leave the plane.

"For heaven's sake, hurry up, Jean!" the doctor growled. "Don't you think that we're late enough? Get your things together so that we can leave quickly! . . . Our car is waiting for us."

He noted outside the gate the long black automobile which would drive him to the Aigopala laboratory. The chauffeur sat at the wheel and a doorman opened the rear door.

"Perhaps we could drive Noroy to his hotel," the professor said turning to his secretary. "Where on earth has he gone?"

"He's gone ahead of us, uncle. He is probably going to take the *Air-France* car which is leaving right away for Nice. Do you want me to . . ."

But Thévenet could not finish his sentence and just stood there immobile and silent with his mouth wide open.

"Don't you feel well? . . . What's happened?" his uncle asked him.

The noise of a door violently slammed, and a sudden shout made him turn towards the road which flanked the airport. He could then see what had frozen Jean Thévenet.

The doorman was rolling on the ground by the black limousine. The window-glass of the door was completely shattered by the shock. The chauffeur lay stretched out on the cushions and could not be seen. "Good Lord!" roared Marandon. "What's going on? What's happened to those two men?"

They hurried toward the doorman, who had nearly lost consciousness.

"Someone walloped me," the hapless fellow stammered.

"Come on now, you went down by yourself," one of the entrance guards shouted. "I was watching you at the very moment. You were whistling and suddenly fell over backwards."

"Someone socked me, too," the chauffeur complained, as several men straightened him up behind his wheel.

"But who?" asked Marandon finally reaching the first row of the onlookers.

"I don't know," the man murmured still half groggy, while he rubbed his bruised forehead.

"Do you think you can drive now? I am Professor Marandon."

"Oh! I recognized you right away . . . If you will just get in the car, sir," the chauffeur painfully said while trying to assume once more the tone of a trained servant. "If I only knew what happened . . ."

And he looked around for his companion who was staggering and trying vainly to open the door that had the broken glass.

If you value your liberty and your life, don't get in that car," someone breathed into Marandon's ear.

The old man furiously spun around and found himself face to face with Noroy who was mopping the perspiration from his brow.

"Can my nephew be right," Marandon asked him in a low voice, "and do you have some reason to upset my plans?"

"I have no other concern than to save you from the danger which threatens you . . . a danger which you cannot see. Time is pressing and I can't give you any other explanations. Try, however, to open one or the other of the back doors of this car which you counted on taking."

"All right," said Marandon. "Let's go," he shouted to the chauffeur.

"Permit me to open the door sir," said the doorman. The obstinate handle failed to yield to all his might.

"Let's go around to the other side," the chemist ordered.

The other door offered the same resistance, and not even the chauffeur, who had leaned over from his seat in the car to help, could make it yield to the vigorous pulling of his companion.

"This car would not have taken you to Aigopol laboratory," Noroy asserted. "It's a trap, to take you to a prison destined for you! Believe me: the moment that you would have climbed into this car you and your nephew would have been captives. Let me take over from here—and trust in me."

"I should like to know what you're driving at," muttered Marandon. "All right, do as you please, but if you've tried to make me look like a fool . . ."

Noroy was no longer listening, for a motor roared. "Don't let this car leave," shouted the professor to two policemen on duty at the gate of the field. "Hurry up and do something!"

"What's that?" exclaimed the chauffeur. He started the motor immediately. "Get in—fast!" he bellowed to the doorman.

"Stop!" Noroy yelled as he saw the car pull out.

The two officers dashed forward. One of them was hit by the right fender of the car and rolled in the dust. His comrade prudently jumped to one side and allowed the vehicle to pass. It soon disappeared on the road to Cannes.

Marandon, standing in the middle of the road, didn't know what to think . . . The turn of events seemed to verify Noroy's words. Evidently these men *did* want to kidnap him and had fled when their plot was foiled. But how did the professor know? . . .

"Why didn't he forewarn me?" Marandon thought.

"If he had clearly told me what was in store for me here, instead of only alluding to it . . . But would I have believed him? It is unbelievable . . ."

"What shall I do?" he asked his nephew.

Jean Thévenet seemed as disconcerted as Marandon.

They say that Arago, member of the polytechnic institute, and a mathematical genius, could not add correctly. Jean Thévenet—though no genius—was descended from that race of academicians who have a great discursive intelligence, but are unable to cope with the problems of everyday life. He had a thin face and myopic eyes and he was, to say the least, quite upset by his uncle's narrow escape. The episode evidently did not conform to the "given information of the problem," and without doubt Jean Thévenet could have easily believed that the aggressors—if such there were—belonged to the category of those paradoxical "imaginary quantities" which astonish the uninitiated and are the joy of the specialists in higher algebra.

The confusion of his uncle disturbed him even more than the inexplicable event which he had just witnessed. Now, for the first time the old man was asking his advice.

"Unless you have good reasons to suspect Noroy, we must follow his counsel," cautioned Jean.

"You risk nothing by accompanying me," added the professor, who had rejoined the two men. "If it's all right with you, we are going to get into the *Air-France* car leaving right now for Nice. We shall go immediately to the home of your friend, Sarlat. The information that he will give you will astonish you, perhaps even pain you, but I am sure that when you have heard it, you will have confidence in me. After that you will have to leave it up to me to provide for your safety. If you want to save your discovery you must take my advice and return at once to the *Dodecagon*."

THE DODECAGON! A legendary name often in the headlines in times of international crisis. What is the *Dodecagon* going to decide? What secrets are being worked out behind these great walls which are like the ramparts of an atomic plant? In these busy and silent corridors the doors open automatically by means of electric eyes. Well-spaced loudspeakers, located near the ceiling, call out a few syllables: a number. Upon hearing his assigned number, the worker must dash immediately to his nearest superior.

Everyone at the *Dodecagon* carries under his clothing a radioactive identity card which is changed every evening. Geiger counters, hidden in the walls, continuously check all persons in the building. Heaven help the fellow who dares enter with a card even one

day old! Steel doors close in front of him and behind him and electrically charged bolts lock the doors. At the same time the guards leap to their machine guns and the warning, "SUSPECT POST 84-8," flashes in red letters on the bulletin board!

Paradoxically enough a lovely garden blooms in the heart of this enormous steel and concrete edifice. Near the center of the building the twelve huge walls come to an end. In their stead a single, thick, circular wall envelops an enclosure containing many large trees. Within this enclosure—miraculously reconstructed—is found the "Folie" of Madame Du Barry: a real eighteenth century orange-greenhouse. It has high arched windows, ornamented medallions, and a majestic flight of stairs which is flanked by two sphinxes and leads to the lawns bordered with flowers.

On this particular morning, fifteen men, holding various ranks, were assembled in the Sphinx room. These fifteen, all sworn to the greatest secrecy and invested with the highest posts, held the destiny of France in their hands. Favre-Perronnet, chief of the army general staff and director of the *Dodecagon* was seated behind the historic desk of Vergennes; at his side were Favreau, chief of armaments; Dubourdieu, director of atomic research; Grandmorel, son of the academician and specialist in self-guided projectiles; and Lemazeuil, director of explosives and combustibles. Lemazeuil was speaking excitedly and pointing his index finger at his interlocutor.

These men represented perhaps the greatest concentration of creative genius existing in the country. The heavy man who was listening to Lemazeuil was Andrieu, the chief of police, who was dwarfed by the intellectual stature of this associates and who clearly understood little of what was going on around him. The only elderly man of the assembly was the academician Virevolta-Larose, an enormous fellow, who was comfortably seated in an armchair: Virevolta-Larose—the father of the classical method of extracting gold from the ocean by means of fluorides.

The atmosphere was tense: the scientists chatted in little groups. It seemed as though they were waiting for an ambassador bearing a declaration of war! Suddenly, the door to the right swung wide open and an orderly called out:

"Monsieur Jules Marandon . . . Professor Claude Noroy."

"Please be seated, gentlemen," said Favre-Perronnet whose face did not register the slightest surprise. "Monsieur Marandon, you have the floor."

The two scientists didn't have the appearance of ambassadors. Marandon's collar was somewhat battered, his tie was crooked, and he mopped the perspiration from his brow incessantly. Noroy, seemingly more calm, was unconsciously chewing his lower lip . . . The assembly, however, hardly noticed their appearance, for their words indeed bore a striking resemblance to a declaration of war.

Without ceasing to wipe his brow, Jules Marandon related how the passengers of the Paris-Nice plane had nearly been wiped out; then he gave a detailed description of his flight to the South, his arrival at the Nice airport, and the strange welcome which had awaited him there.

"After that," he continued, "my nephew and I met with other unpleasant experiences. The enemy had arranged some unwelcome surprises for us. . . . After our narrow escape at the airport I took Noroy's advice and hurried to the home of our colleague, Sarlat. Like Noroy, Sarlat warned me to be extremely careful. However, in my impatience to get on with my work I hardly even listened to him. My first concern was to



"One of them was hit by the right tender . . ."

telephone the Aigopol laboratories where, I was convinced, my assistants were anxiously awaiting me. I called in vain; I was unable to reach them. A half hour later, Sarlat himself informed me that the laboratories had been destroyed by a great explosion. Not one part of these costly plants had survived the blast. Strangely enough when the rescue party reached the scene they were unable to discover any bodies. No one could understand what had become of the engineers and the chemists as well as their colleagues and employees who had been working in the factory at the time of the explosion. Ten persons had disappeared; their bodies were sought in vain under the debris. The papers, you will remember, reported that not the slightest trace of them could be found."

"In a word, everything came about just as Noroy had prophesied. Certainly I had never doubted his word, but I had imagined that our colleague was exaggerating the gravity of the situation. I hope that he will pardon me."

Marandon stopped talking and all eyes turned toward the professor. They were clearly waiting for him to clarify Marandon's remarks. Noroy merely smiled and with a wave of his hand exhorted the assembly to be patient.

"As you may well imagine, gentlemen," Marandon continued, "Noroy, Sarlat, and I had a very heated conversation. I asked Noroy to explain to me what I had a right to know. Our colleague then informed me that the moment had not yet come when he could reveal to me all that he knew. Furthermore, he said, the facts spoke for themselves: I was in danger. For the moment I would have to listen to him and protect myself. He said that when the time came he would explain the fantastic events. According to him, my first concern was to accompany him back to Paris. Once more I gave in . . . You know, gentlemen, how I barely escaped with my life on arriving at the *Gare de Lyon*, but you perhaps don't know that my enemies tried to kidnap me again during my trip home. Since Noroy has asked me to, I am going to give you an objective account of the incident.

"We took the train at Nice the night before last.

Sarlat had reserved for Noroy, my nephew Jean Thévenet, and myself two sleeping berths. We boarded the train less than a minute before it left the station. Noroy had decided that we would leave our refuge at Nice only at the last moment, and he had driven the car, which Sarlat had put at our disposal, at a terrific speed to the station, slowing down only when we were a few hundred feet from the entrance. We got out of the car quickly, but did not rush to the train lest we attract attention. In short, there was nothing spectacular about our departure, and I am still convinced that no one, either at the entrance or on the platform, noticed it except of course those who were watching us. For I must admit now that we were watched every moment and that our adversaries—you must get accustomed to hearing me use this word—constantly spied on my movements and actions.

"A moment after we had entered our compartments and made ourselves comfortable, the train pulled out.

"Noroy had decided that I would sleep alone in my compartment and that he would share the other with my nephew Jean. I learned only later that he and Jean had resolved to take turns guarding me.

"Nothing unusual happened during a good part of the night. It was certainly hard for me to fall asleep. I just couldn't understand Noroy's attitude. He had prevented me from returning to Aigopol and from taking the slightest part in the inquest concerning the destruction of the laboratory; he claimed that my life was in danger and he did not think it necessary to ask for police protection for me . . .

"During that very night I was to be given conclusive proof that a mysterious power was watching over me and that police protection would have been totally useless. For all that, however, I was not yet to learn what it was nor how it operated. At this very moment, gentlemen, I tremble at the thought of revealing such bizarre events to you. Will you believe me? Though you may not doubt my good faith, you may believe I am mentally unbalanced."

At that, Marandon turned apprehensively toward Noroy. The silent but supplicating look on his face moved the professor, who now, for the first time since he had entered the room, spoke:

"No one will dare to contradict you, my dear colleague," he said. "You must relate your experiences just as you have lived them. After you have finished

I shall clarify your remarks to the best of my ability."

Marandon resumed: "I finally succeeded in falling asleep, and was able to rest peacefully until four o'clock in the morning. It was just four o'clock when I woke up and discovered that the train was no longer moving. Outside I could hear people running all along the train. Smothered shouts, whisperings, and a blow against the car in which I was lying made me aware of some indefinable danger and I leaped out of my berth. After turning on the light, I raised the curtain and opened the window. I could then see that the train had stopped in a little station whose name I was unable to discover. Furthermore, I had no time to ask where we were, for under me, on the platform, were four men holding pistols aimed at me!

"Don't make a sound," one of my unknown assailants said. 'Do as you're told and keep quiet!'

"Behind me, the door of my compartment (which I had locked before going to sleep) had just opened and two men who were also armed moved quickly toward me. To my horror I saw my nephew Jean, stretched out unconscious on the floor of the corridor.

"Take your clothing and follow us," muttered one of the intruders. 'Don't make us get tough.'

"I was in my pajamas and still half asleep. My only thought was for my nephew. Was he still alive? . . .

I must say that no one ever ordered me around in such a way before. Besides I had neither the desire nor the strength to obey. Without worrying about the guns which were staring in my face I pushed my attackers aside and rushed to my nephew's aid. I heard him groan and saw him painfully get up. Thinking that the two ruffians would try to knock him out again, I wheeled around in order to protect him and was confronted once more with a bewildering spectacle! The two kidnappers were being hurled through the window by some invisible force! One of them fell on his accomplices who were waiting on the platform below; the other, whose coat had been caught on the window knob, remained suspended in midair!

"Strong emotional disturbances affect me very much. I felt the blood rise to my face, and my ears began to ring; an intolerable whistling sound nearly broke my eardrums during the next few seconds, and I thought I was going to faint. Stumbling, I made my way toward the open window, not so much to see what was happening on the platform as to get some



"The two kidnappers were being hurled through the window by some invisible force."

fresh air in my lungs. I wanted so desperately to catch my breath that for the moment I completely forgot about the pistols which had threatened me a few seconds before."

Marandon was panting. Without a shadow of a doubt he was intensely reliving the drama in which he had been the principal, and the memories of that night were causing him considerable anguish.

"But what I saw, gentlemen," he painfully continued, "nearly stifled me. The four men who had menaced me were disappearing one by one. Mind you, they weren't running away . . . No . . . they seemed to melt suddenly into the air. . . . In less than a fraction of a second they were no longer there! And as far as I could make out in the dim light of the station, as they disappeared they seemed to be in mortal fear. Soon there were only two of them, then one. Finally I could see only the man who had been thrown out of the window with his accomplice. He was writhing and groaning on the ground, probably because one of his legs had been broken. In another instant he too vanished!

"If that horrible whistling had only stopped ringing in my ears I might perhaps have had the strength to lay my hands on the last of the thugs who was still grotesquely dangling outside the window. Before I could come to myself, however, he, like the others, dissolved into thin air. His coat tore away from the window knob . . . he fell . . . and disappeared before reaching the ground.

"It was impossible for me to believe that this fantastic manifestation of a supernatural power was only a hallucination. Part of the man's coat still remained in my compartment! I grabbed it instinctively and ran my fingers over a rich English cloth. Although closely woven, this material had torn under my very eyes as easily as a sheet of paper!

"This frightening scene didn't last more than thirty seconds; nevertheless I was completely worn out. When Noroy, whom I assumed to have just awakened, entered my compartment, I had nearly lost consciousness. The fate of my nephew especially worried me. Noroy informed me that Jean had only been stunned by a violent blow and that he would soon be all right. As I started to tell him what I had seen he commanded me to be silent. For the time being, he said, the danger was over and we would have nothing more to fear until we reached Paris.

"Suddenly the silence was broken on the deserted platform. As Noroy and I leaned out of the window we saw the stationmaster accompanied by two repairmen running toward the train. Soon we could make out what they were saying.

"So help me, I can't understand it," one told the other. 'The switch was open . . . the engine's okay . . . it'll all be cleared up soon . . . the track's clear . . . needless delay . . . never saw anything like it . . .'

"A moment later the train got under way. In a little while our colleague Noroy will tell you the results of the administrative inquest which sought to discover why an express train had stopped in the little station of Thénisy.

"Fortunately my nephew soon felt a lot better. He told us that as the train pulled to a stop he had seen two innocent looking fellows coming along the corridor and had moved aside in order to let them pass. As he huddled close to the door of my compartment he had received a violent blow in the stomach and had fallen nearly unconscious to the floor.

"The repairmen at Thénisy, we later found out, had been wrong. The train had stopped because of a closed switch. You have read nothing about this

incident in the newspapers, because the press, acting on the orders of the Minister of the Interior, made no mention of it. Therefore I must tell you that two signalmen had been put out of the way near this closed switch by those who wanted to stop the train and kidnap me. The operation not only was feasible, but had been carefully prepared and carried out without resorting to either magic or sorcery.

"How then can we explain the sudden disappearance of my assailants? Are we to suppose that the incomprehensible phenomenon which made them vanish in front of me was part of their plan to make a fast get-away? Was this their means of escaping before the arrival of some powerful enemy?

"Not at all, if we can believe the eyewitness report of Albert Lornet, a railway worker at the Thénisy station. Lornet, who lives near the depot, was roused from his sleep when the train pulled to a stop not far from his house. He saw a number of lifeless bodies roll along the embankment and slide down toward his cottage. He heard groans and shouts. Finally he saw several men climb out of the three cars nearest his door, pick up their fallen companions, and drop them in nearby limousines. A second later these autos were racing down the road at breakneck speed and soon disappeared in the night. I believe—and I'm sure that you do too—that the wounded or dead men whom Lornet saw were the victims of the mysterious power which was watching over me. I further believe that it will be difficult for you, Noroy, to make my story seem plausible."

"Not at all, my dear friend," the professor replied. "Your account of the events in which you were involved is objective and true to the facts. I shall have no trouble proving it to my colleagues when you have finished the rest of your story. For you still have to tell them about the attempt which was made on your life here in Paris at the *Gare de Lyon*."

Marandon breathed deeply. He had not yet finished . . . The most astounding part was still to come.

"When the train left Thénisy," he continued, "Noroy refused to tell the train guard what had happened, although I pleaded with him to do so. He told me emphatically that for the time being the whole affair had to be kept secret. He answered all of my questions with silence. I am as anxious as you are to hear what he has to say today. Therefore I am going to be as brief as possible.

"Our train entered the *Gare de Lyon* one minute early. Naturally I wasn't able to fall asleep again. But worry, even more than fatigue, exhausted me. I lost my peace of mind. I made my way feverishly toward the exit, well ahead of our porters. My nephew and Noroy accompanied me and at times walked so quickly that it was difficult for me to keep up with them. For two cents I would have run . . . and I would have fallen even more quickly into the trap that was prepared for me!

"As we neared the exit of the station a tall man slipped out of the crowd that had gathered to meet the incoming passengers and aimed a revolver at my chest. The weapon was less than three feet away and the knowledge that nothing could save me made my knees buckle under me. A second before the gun went off I heard a shrill whistling sound. I was sure that this time I was through. My assailant couldn't possibly have missed me, and yet . . . it was he who collapsed! Instinctively I slid my hand under my vest, and groped for the wound to stop the flow of blood. I found nothing and I stood there stupefied, while around me people began to scream and to push each other wildly.



"My assailant couldn't possibly have missed me . . ."

"As you know, the would-be killer disappeared. Taking advantage of the tumult and disorder he quickly got up and easily made his escape. His gun, still warm, was found lying near my feet.

"I wasn't wounded. Seeing this, Noroy and my nephew pushed me into a cab which drove me here. As you well can imagine I felt safe only after the doors of the *Dodecagon* had closed behind me. No doubt you noticed when you came in here that the police—whom Noroy had alerted—are carefully guarding this building and its surrounding gardens. I suppose then that I have nothing more to fear—and yet I can't help being frightened. I still can't believe that what happened to me was real.

"Even as I stand here I keep thinking about the shooting in the *Gare de Lyon*. I just can't figure out what became of that bullet. There's no doubt that the assassin had fired at me. The ballistic report of the Municipal Laboratory has verified this. *How could his shot have missed me?* I also wonder what happened to my assistants at Aigopal and why, whenever I was in danger, I heard that horrible whistling sound. Our good colleague, Noroy, will now take over. I hope he will keep his promise and clarify these amazing events."

A WAVE OF SILENCE passed over the Sphinx room of the *Dodecagon*—a silence broken only by the noises which came from the city without. A gust of wind swept through the leaves of the trees lining the garden of the *Dodecagon*.

"I suppose, gentlemen," Noroy said in a sonorous and serious voice, "that you want above all to know who is threatening the life of our friend Marandon—and why they are trying so hard to kidnap or murder him. You probably also want to know what unusual methods were used to attack or defend him. I hope my answers will satisfy you."

"What the enemy wanted and almost got is in the thin leather portfolio which our eminent friend has just put on the table. My dear Marandon, tell us what you've got in there."

The old scientist mopped his brow and answered: "Extremely important documents. First of all the in-

ventory of the stock of neo-propane at the Aigopal laboratory."

"What else?" Noroy asked.

"... an account of my latest experiments on synthetic jasmin."

"Go on," Noroy said impatiently. "You know very well that we aren't business men."

"... and the rotation schedule of the employees in my plant. Finally . . ."

The chemist stopped speaking for a moment, examined the faces of the scientists around him, and continued in a very low voice: "I slipped into the inner pocket of this portfolio a four-page summary on the new possibilities, on the . . ."

"Speak up, man," ordered Noroy. "You can't keep this a secret any longer."

"Very well! *This summary holds the answer to the problem of converting sea water into fuel.*"

The assembly gasped. A moment later the scientists were excitedly exchanging words. Lemazeuil cursed under his breath.

"I must say," Marandon continued, "that this summary is incomplete. How shall I put it? I didn't include the whole formula. I omitted that part concerning the chemical transformation which brings about the release of this particular form of energy. Do you get it, dear colleague?" added Marandon, turning to Virevolta-Larose who was staring at him fixedly.

The heavy scientist, half off his seat, acidly replied: "Come now, my dear fellow, what are you trying to hand me? Sea water used as fuel? You know very well that I never put much stock in that!"

"I know," Marandon said without a trace of irony. "But I'm in dead earnest."

"Let's have the details, sir," General Favre-Porronnet curtly said.

"Gentlemen," began Marandon regaining his assurance. "We've been talking for a long time about using water and especially sea water instead of the combustible liquids which are derived from petroleum. Much nonsense has been written about this subject and it seems evident to a chemist of the old school that water is a residue, a saturated body . . ."

"You might call it ashes!" interrupted Virevolta-Larose.

"That's it! It's really the ashes of a gigantic combustion—that of hydrogen which has combined with atmospheric oxygen . . ."

"Allow me to ask you then what you can get out of ashes," interjected Virevolta-Larose.

With these ashes you can do your wash! thought the chief of police. Fortunately for him he kept this bright remark to himself.

"I'll tell you what you can get out of ashes," Marandon replied to Virevolta-Larose. "*You are forgetting the second valence of hydrogen!*"

"A second valence, a second valence!" exclaimed Virevolta-Larose. He could not have been more indignant if the state had asked him to pay his income tax twice during the same year. "But my dear Marandon, you are speaking of a very rare affinity which has been observed only in certain organic bodies, and I defy you . . ."

"Perhaps I should tell you before you challenge me, Virevolta, that I have brought about the saturation of the second valence of hydrogen . . ."

"Of the hydrogen of water?"

"Precisely!"

"In other words the water burned?"

"That's right!"

"And you obtained what?"

"I obtained a tenth of the energy which is released by the ordinary oxygen-hydrogen explosion which, you remember, is twice as powerful under certain conditions as the explosion of dynamite."

The assembly chuckled. Virevolta-Larose had nearly fallen out of his seat.

"Dynamite! dynamite! You're about a century behind, my dear colleague! Ask Colonel Dubourdieu, the atom specialist, what he thinks of dynamite as compared to the nuclear explosives of today!"

"This is what I would say," said Dubourdieu in a serious voice. "At the time we made our most powerful atomic explosions, we could use only a few pounds of active matter, whereas now Monsieur Marandon has at his disposal trillions of cubic feet of sea water."

A heavy silence hung over the room once more. Each member of the assembly grasped immediately the significance of Marandon's discovery. And each had visions of a world rocked by disorders and covered with ruins. In their mind's eye the scientists could see reservoirs drying up, oil refineries closing their doors, and thousands of people being thrown out of work. At the stock market the "combustible liquid" stocks were plunging rapidly toward zero. It was as if a finger of fire, like the one which had appeared at Belshazzar's feast, had written on the wall these fateful words: THE DEATH OF PETROLEUM!

"Tell me, Monsieur Marandon," Dubourdieu suddenly asked, "if the experiment succeeds in one place on the globe and someone neglects to take certain precautions . . ."

"Go on."

"Isn't it to be feared that the reaction, once started, may develop into a chain reaction and spread over all of the oceans of the earth?"

"Certainly," said Marandon, "the released energy is more than sufficient to transmit the combustion into large masses of cold water."

"But then . . . we run the risk of setting the world afire!"

"That is indeed possible," the scientist retorted, "and that is why I ask you to check the results of my work with the greatest care."

The members of the assembly began to talk all at once. Some criticized Marandon severely; others praised him highly. One scientist wanted further information; another sarcastically asked the old inventor questions; still another claimed that Marandon's pretensions were absurd. It was easy to see that most of the reputed chemist's colleagues were prepared to ridicule his theories.

At this point Noroy thought it well to intervene, and his powerful voice rang out over the tumult, interrupting the heated discussions. "I hope that you won't insult our learned colleague by refusing to believe him," he exclaimed. "Certainly if the attempts on his life do not sufficiently prove to you that he has made an important discovery, the experiments that you will soon see will. Marandon's enemies realize the importance of his discovery and would give a fortune to anyone who would hand over to them this green portfolio."

In the ensuing silence Noroy lowered his voice. He spoke with such confidence, his gestures were so forceful, that no one dared to interrupt him except the obstinate Virevolta-Larose.

"Do you know who these enemies are, my dear friend?" the enormous academician asked.

"I know at least two of their chiefs: Otto Falkenberg and Venecelas Altkim. I will name the others later, because I don't want to say anything that I can't prove. Besides, we will have nothing to fear

from them so long as Marandon remains in the *Dodecagon* and so long as his portfolio is kept in our vaults."

All eyes turned toward the chief of the army general staff.

Behind Favre-Perronnet, who appeared taller and mightier than a pillar of an Egyptian temple, could be seen the gigantic—indeed the only—steel door leading to the vaults of the *Dodecagon*. Jutting out from the shiny metal were three huge wheels which were similar to the steering wheels of a ship. On the right side of the door were two levers; on the left ten wide buttons arranged in rows of five. In the door's casing were fifteen black, gaping holes: the muzzles of automatic machine guns.

The General got up.

"Mallefeux? Do you have your key?"

A captain came forward, holding in his hand a flat, small key.

"Colonel Maillard?"

"Here is my key, General."

Three men had to be present in order to open the vaults: the three locks had to be released simultaneously. When the General gave the signal Maillard advanced toward the door and thrust his key into one of the locks, turning it forward and backward a number of times. After doing this he bent down, put his key in a keyhole near the floor, and left it there. Mallefeux repeated the same operations on the other side of the door.

"What would happen," asked Noroy, "if you forgot about the keyholes down below?"

"The machine guns would fire," Dubourdieu softly answered.

General Favre-Perronnet moved forward in his turn. He didn't have a key, but held in his hand a square, thin metal plate which he had taken from his pocket. After adjusting the ten buttons he raised the mysterious metal plate and placed it on a square of the same size which was engraved in the center of the steel door. With a slow and irresistible movement, the door opened, pushing Favre-Perronnet back little by little. Noroy realized that the open-sesame metal plate was a condenser charged with radioactive particles which were arranged according to a secret code.

The door weighed a hundred tons; its sections were laid out like the steps of a staircase in order to discourage safecrackers. Behind it was a heavy iron grating which was raised like a medieval portcullis. A brightly lit staircase led down into the vaults.

As Marandon advanced toward the vault, Favre-Perronnet grabbed his arm. Mallefeux bent down and released with the third key a little lever located on the inside of the door. Then he adjusted the lever and stepped back.

"Captain Mallefeux has just set the security dial to zero," the General explained. "If you had entered, Monsieur Marandon, you would have crossed an invisible infra-red curtain and . . ."

". . . and?"

"The vault would have been flooded in thirty seconds. We can enter, now."

Those who know about vaults rightfully admire the *Dodecagon*'s; it is even superior to the underground passages of the Bank of England. Its foundation is surrounded by a granite wall eighteen feet thick, equipped with acoustical detectors. The slightest scraping of a pick-axe against this wall would cause the detectors to light up the red danger signal on the building's central bulletin board. Adjoining this granite wall is a column of water six feet wide which is always under pressure. Finally there is the

vault itself supported by granite pillars. It is made of reinforced concrete and contains a network of steel coils which are as sharp as razors. Lastly it is lined with thick sheets of steel and manganese.

Dubourdieu was holding his chronometer in his hand:

"It took just six and a half minutes to open it," he observed. "That's a record. Usually it takes us eight minutes."

Following General Favre-Perronnet and Marandon, everyone entered the vault. One by one they went down the thirty-five steps which led to the rooms below. The General advanced toward one massive vault and, with the help of his assistants, proceeded to open it. Six minutes slipped by before the door of the safe finally swung open.

Marandon walked to the vault and showed Favre-Perronnet that the documents were in his green portfolio. Then he placed the portfolio on a small table in the huge safe. After this they locked the vault and a few minutes later the heavy door of the strong-room was closed in its turn, and the assembly returned to their seats in the Sphinx room.

AFTER EVERYONE was seated, Noroy began to speak:

"The decisive experiments that you are waiting for will take place next Tuesday under your very eyes in the underground laboratories of the *Dodecagon*. Be patient, gentlemen."

Patient! They felt that they had been too patient. No one, however, dared to wrangle with Noroy, especially since he had promised to make some startling revelations of his own that very day. An air of expectancy hung over the room. Each of the assembled dignitaries anticipated the announcement of some remarkable discovery—a discovery quite different, perhaps, from Marandon's, but no less dramatic. They all knew that the naked truth, when suddenly revealed, is often blinding, and that it is understood only after much thought and deliberation. Consequently they listened to Noroy attentively in order to be better able to criticize his remarks or to ask him for supplementary information.

"If you will forget for the moment the contents of the green portfolio, it will not take me long to explain to you the events of the last few days," Professor Noroy said. "To simplify matters I shall first draw up a list of the questions which I am sure are uppermost in your minds:

"One: How did the *Languedoc*, which was to carry Marandon to Nice, escape destruction? Where was the bomb hidden in the plane? How did the bomb land in the middle of the field where it exploded?

"Two: Who destroyed the Aigopol laboratories and what happened to the chemists and engineers who were working there?

"Three: How were the two men who tried to kidnap Marandon at the Nice airport foiled?

"Four: Who were the thugs who tried to kidnap Marandon at the Thénissey station? What happened to them?

"Five: How did Marandon escape death on arriving at the *Gare de Lyon*? Why did the bullet, which was fired at such close range, never touch him?

"I have that bullet right here in my hand, gentlemen. It was caught as it left the gun."

This time it was too much. When Marandon had answered the questions of General Favre and Virevolta-Larose, his remarks had been received with sarcastic smiles. The scientists had shrugged their shoulders, raised their eyes toward the ceiling, and

rubbed their feet along the rug as if to sweep away what they were hearing. Their attitude had testified to their disbelief. Noroy now received the same treatment. His colleagues simply couldn't believe that so eminent a man of science could talk such nonsense.

Noroy sensed that his listeners would walk out on him if he didn't put all of his cards on the table immediately. "Pardon me," he said in a clear voice which drowned out his whispering audience, "I confess that I have tried to puzzle you—and perhaps I have succeeded only too well. Admit, however, the following simple truth: If a man succeeds in . . ."

Noroy was unable to finish. An orderly, who had just entered the room, tiptoed rapidly to the president of the assembly, Favre-Perronnet, and whispered something in his ear.

"I have just been informed of the arrival of Professor Esprels," said the chief of the army general staff. "Esprels is accompanied by his friend Sir Samuel Rides, and would like to see us at once. Sir Samuel, it seems, has important news for us. I suppose that it wouldn't be right to make them wait."

A murmur of disappointment was heard in the room—a murmur which Noroy quelled with a wave of his hand.

"Allow Esprels and Sir Samuel Rides to come in, General," he said. "I shall continue later."

Then he sank back into his armchair.

The professor and his English friend entered and made their way toward General Favre-Perronnet. Suddenly a terrifying, thunderous noise filled the hall . . . Everyone turned around. The gigantic door protecting the *Dodecagon's* strong room had just swung open . . . by itself!

General Favre clutched his breast as if he had been dealt a powerful blow. Virevolta-Larose, on the verge of an apoplectic fit, frantically covered his ears. A second later the room was filled with shouts of surprise and indignation.

"What's going on?"

"... impossible! . . ."

"... it's a pretty poor joke. . . ."

"... our secrets! . . ."

"... The green portfolio! . . . the green portfolio! . . . the green portfolio! . . ."

Knocking over his chair, Jules Marandon dashed into the strong room. No one thought it strange that he seemed beside himself with fear and bewilderment. This door, which had been so carefully bolted, had opened all by itself. If this could happen, anything was possible!

"... The green portfolio!" Marandon repeated, screaming. "The green portfolio . . ."

He became silent only on arriving in front of the safe in which he had placed his precious documents a few moments before. The safe was open, and he saw immediately that the portfolio was still there. However, the trembling fingers of the old chemist searched its leather folds in vain . . . The documents were gone!

DURING THE NEXT few minutes confusion reigned in the Sphinx room. No one could believe his eyes. Questions and reproaches were on the tip of everyone's tongue.

The alarm had not sounded. The current had somehow been cut off.

But the gigantic vault had only one entrance which faced the Sphinx room; and this entrance was guarded by the huge steel door which could be opened only after performing a long and complicated series of

operations. At least so they had thought, for although no one had laid a hand on the intricate locks, the door had mysteriously swung open. For all their bewilderment, the members of the council simply couldn't believe that an invisible thief had brought this about.

As Marandon's dazed colleagues dashed in and out of the strong room, Favre-Perronnet hurried to a panel encased in the wall and pressed five or six buttons which sounded a general alarm throughout the *Dodecagon*.

"Either Marandon is the victim of some kind of hocus-pocus or we are all crazy," stammered Virevolta-Larose.

"Either that or someone has discovered a different way of entering the vaults," Andrieu suggested.

"Come now, Commissioner," retorted Dubourdieu, the director of atomic research, "you know very well that the strong-room is protected by thick granite walls and by tons of water under pressure!"

In an anguished voice, Lemazeuil, the director of control of explosives, grilled Marandon. "Are you certain that someone can use the stolen documents?"

... How long will it take you to reconstruct your formulas?"

Stupefied, the old chemist did not reply.

On the other side of the table the enormous Virevolta-Larose, purple with rage, leaned heavily toward Noroy who was reclining in his armchair.

"Here's a mystery you can add to the others, eh?" he growled. "You'd better tell us quickly what this is all about. But so help me, if you can make me understand how that damned portfolio was emptied, I'll eat your hat."

"Calm down, gentlemen," thundered Favre-Perronnet. "Take your seats!"

When something resembling silence had fallen over the room he continued speaking: "The thief cannot escape from the *Dodecagon*. I assure you that it is impossible for him to get past our guards. A few seconds ago I ordered the guard tripled. I am therefore certain that the man we're after is still within these walls. However, I must frankly admit that I can't explain this astounding event at all. If one of you can suggest something, I am sure that we would all be glad to hear it. I ask you only to be brief."

Now, all eyes focused on Noroy. But the professor, who was as white as a sheet, was unable to get up. Leaning forward in his chair, he began slowly to speak. "My fears, gentlemen, were only too justified. Our enemies have finally triumphed," he said. "I hope you will excuse me," he added with difficulty. "I am simply too upset. . . ." He doubled up. Falling forward, he gently slid to the floor in a relaxed heap. The men began to move about excitedly. Several bent over Noroy, opened his collar and stretched him out on the floor. "He'll be all right if he rests," said one. "He has fainted . . . nothing more."

One man headed toward the door.

"You can't go now," shouted Favre-Perronnet. "No one will be permitted to leave the *Dodecagon* until the inquest is over." He directed someone to stay with Noroy while they began the search.

eral Favre that Sir Samuel Rides had come to the *Dodecagon* in order to hand over to Marandon data which was indispensable to the completion of his formulas.

The English scientist was silently standing in front of a large window and seemed to take little interest in what was going on around him. A long cry of anguish and surprise made him wheel around. Marandon had just fallen to the floor and everyone was crowding around him.

"He's had a stroke," diagnosed Dubourdieu, looking at the old man's twisted mouth. "It's his second attack," he murmured "God, if he only can pull through this time."

The head doctor was called immediately and did what he could to make the chemist comfortable. Then he gave orders to have him transferred immediately to the *Dodecagon's* hospital. Before he was carried out, Favre-Perronnet searched the stricken scientist's portfolio and clothing once more.

"You're going too far," exclaimed Virevolta-Larose. "You've already searched us once, and I frankly think that's sufficient. I resent the fact that you don't trust us. Your way of doing things, my dear General, is quite offending."

"I don't think I've gone far enough," Favre-Perronnet replied, "since I have discovered nothing. You're not going to ask me to stop the investigation now, are you?"

"You must go on with it until you find the stolen documents," said Sir Samuel Rides, "but I would appreciate it indeed if you would allow me to go now. Your officers have already thoroughly examined both my person and my portfolios."

"Did they find the important papers that you intended to give to Marandon?"

"The efficiency of your police, my dear General, is more than matched by the prudence of my government. We take careful measures in England to prevent our secret documents from falling into the hands of the first foreign agent who comes along."

"The tone of your voice, Monsieur Rides, does not hold out hope for our smooth relations in the future," Favre-Perronnet said softly.

"Excuse me for interrupting, General," Noroy broke in. He was again conscious, reclining weakly on a chaise-longue. "You must understand that Sir Samuel Rides has good reasons to be nervous. Just think of his disappointment . . . his irritation."

"You are free to go, Monsieur Rides," said the chief of the army general staff.

"And I suppose that I am, too," added Noroy. "Will you take me home, General?"

"We will leave after everyone else," Favre-Perronnet replied dryly. "I don't want to overlook anything and I must find out how Marandon is getting along."

One hour later the chief of the army general staff drove Noroy home. As they sped along the busy streets of Paris, Favre-Perronnet mused over the events of that memorable day. Unable at last to keep his thoughts to himself he began to speak to Noroy who was sprawled out beside him. "Marandon seems to me to be in pretty bad shape. Take my advice and don't let the same thing happen to you. Imagine!

THE SEARCH ORGANIZED by Favre-Perronnet yielded nothing. Each member of the council was carefully questioned by the General's assistants. Some took the questioning willingly; others, less obliging, angrily told their examiners that Marandon's documents had melted into thin air. Professor Esprels informed Gen-



He's not only half paralyzed, but he's lost his memory and he can't speak. I am sure that his discovery will disappear with him if he . . ."

"Rest assured that we have left Marandon in good hands at the *Dodecagon*," said Noroy. "And as far as his discovery is concerned, I can tell you right now that when the proper time comes, you and I alone are going to save it."

"I give up trying to understand you, Noroy," murmured the General. "I've always thought that you were a sensible man, but I'm changing my mind fast. You've been talking like an old fool all day long. What's more, I have a feeling that you have no intention of clearing up all the riddles that you and Marandon threw out at the *Dodecagon*. You won't be surprised, then, if I tell you that your colleagues and I are pretty sore at you. We think we're entitled to an explanation, and you can be sure that we're not going to look up to you again until you give us one."

Noroy smiled. "I'm very weak, now," he said. "Time will justify me and before long you will think well of me again. Well, I'm home, General. So long, and thanks for the lift." With this, he got up painfully and climbed cautiously out of the car, parked near the lovely garden surrounding his villa at Auteuil.

Favre-Perronet watched him as he walked slowly toward the house. "There's no doubt about it, Noroy is getting old," he thought. "So long," he said dryly in answer to a wave of Noroy's hand.

"What a day!" he murmured as he rode back to the city.

That evening as he prepared to go to bed, he discovered that someone had stolen his wallet.

Two days later it was returned to him by mail. And to his utter amazement General Favre found, on examining it, that it was completely intact. *The thief had taken nothing!*

AT THE NORTHERNMOST limit of the forest of Rambouillet, not far from Montfort-l'Amaury, a peaceful village provided Claude Noroy with the quiet atmosphere necessary for his scientific meditations. He lived there in a large house, which had all the appearances of a manor and which was surrounded by a magnificent garden. Three servants—a gardener, the gardener's wife, and an old housekeeper named Gertrude Marcellin—freed him from all household cares. From time to time his son Gilbert, a medical student, visited him and brought a little laughter to the house. Noroy rarely had visitors other than his collaborator and friend, the Swiss scientist, Esprels.

Esprels had been living in this neighborhood for about ten years and upon his advice Noroy had bought this estate. A wall separated Noroy's garden from Esprels' and the two scientists had long ago knocked down a section of it in order to be able to meet more easily.

We go back now to December of the year preceding the incidents described above.

Snow was falling. In the warmth of his study Noroy telephoned his old friend Esprels and gave signs of being nervous. After listening to Esprels for a few minutes, he said mischievously:

"Think a moment about what I've said. When I arrive at your house, you will be convinced. I'm leaving right now."

"Hurry up," he heard as he hung up.

A broad smile broke out on Noroy's face, and he swallowed with one gulp the contents of the glass he was holding in his left hand. He knew, of course, that

he was going to feel queer, but what happened was far more surprising than anything he had anticipated. First of all, his clock, high on the wall, instantly stopped telling the time and its long gilt pendulum remained tilted and immobile as if held back by an invisible hand. The dance of the fire in the hearth was interrupted and the flames remained motionless above the logs, giving the appearance of a jagged design cut in a piece of yellow cloth. But perhaps the weirdest sight of all was offered by his drinking glass . . . his glass, which he had accidentally knocked against his desk so hard that it had broken. The shattered pieces were still so close to one another that the shape of the glass had scarcely changed. They clung together miraculously, and the broken glass almost defiantly refused to crumble on the blotter lying on his desk. It seemed to be simply a shadow of its former self.

It was some time before Noroy could tear his eyes away from this astounding spectacle.

"I'd better not waste any more time," he thought. "All the same I wish Esprels were here."

He bent down to pick up a sheet of paper which had slipped from his desk at the very moment when he had swallowed his drug. He was able to pick it up easily between his thumb and index finger, for, in defiance of the law of gravity, it had not fallen to the floor, but remained suspended in mid-air.

The scientist strode rapidly to the door and brusquely opened it.

"What are you doing there, Gertrude?" he asked.

But the servant didn't answer. In addition she didn't budge. Gertrude had become a living statue. With lowered head and a thin smile still at the corner of her lips she continued to listen attentively.

Noroy didn't repeat his question. Abandoning his petrified servant, he raced down the wooden staircase which led to the ground floor. He felt light-hearted and happy and Gertrude's indiscretion didn't annoy him in the least. After all the dear old girl had to know everything that was going on in the house. That was her mania . . . to eavesdrop . . . to tiptoe about the house and overhear what everyone was saying. For sure, this time she would discover nothing . . . He promised himself, however, that some day, under more normal circumstances, he would take time out to catch her in the act just to watch her face get red. Fortified by this thought Noroy nimbly skipped down the remaining steps. "I feel as though I could spring over the last five steps just like Gilbert," he chuckled. Toward the bottom the stairway turned abruptly. Only five more steps remained and Noroy gayly prepared to clear them with one jump.

But Noroy didn't jump. Instead he remained glued to the steps; for the moment he was as petrified as Gertrude on the landing above. For in front of him his son Gilbert was suspended in mid-air! To tell the truth no mysterious power held the lad aloft. Gilbert had sprung into the air in order to clear the lowermost stairs with one bound and had stopped short in mid-course!

Quickly pulling himself together, the professor walked slowly down the remaining stairs. When he had reached the bottom he turned around and stared at Gilbert fixedly. The young man's face still betrayed the effort that had gone into his leap. His smile was frozen, his expression unchanging. Furthermore, his tie, which had been blown over his shoulder, was no longer supple, but appeared as stiff as a board. Such a sight would have puzzled most people. Noroy, however, saw nothing strange in it. Things had turned

out just as he had expected. The scientist steeled himself against any further surprise; his face broke out into a mischievous grin, and he turned his back on his son, leaving him hanging in space.

He stopped once more on his door-sill after drawing gently to him the heavy oaken door which opened into the garden. A magnificent winter scene met his eyes which he studied with the same patience and curiosity that he would have given a specimen under his microscope.

Everything indeed was happening just as he had expected. . . .

Or more precisely, nothing was happening. Nothing, absolutely nothing. The countryside, cloaked with snow, had never been more dead. The wind has ceased moaning and silence reigned—a silence so complete and so overwhelming that Noroy thought that he had become deaf.

The snow had stopped falling, and as far as the eye could see the air was filled with myriad snowflakes which had interrupted their downward course and remained suspended between heaven and earth. As he walked along the professor found it necessary to brush them aside constantly in order to clear his path.

Arriving in front of the break in the wall which separated his garden from Esprels', he turned around in order to see whether there was any sign of life in his deserted garden. He might as well have saved his energy, for there was neither sound nor movement in the deathly stillness. Even the smoke which had been flowing out of his chimney no longer spiraled towards the sky. Gazing at it Noroy couldn't help comparing it to a heavy piece of gray cotton which had been unraveled at one end.

After surveying with evident amusement the bizarre tunnel that he had left behind him in the curtains of snow Noroy brushed away the layers of snowflakes which had accumulated on his clothing, and advanced into Esprels' garden.

The Swiss scientist lived on an old farm which he had remodeled into a country home. In order to get to the main building Noroy had to pass in front of an empty shack which Esprels planned to convert into a garage. A flock of blackbirds, fleeing from the storm, had taken refuge there, or, to be more exact, were preparing to seek shelter under the roof at the very moment when Noroy arrived at the hovel.

A few birds had already landed, but most were still in the air. Their rapid flight toward the shack was arrested as the fall of the snowflakes, and they remained suspended in mid-air. Except for the fact that neither a branch nor anything else was holding them up, they looked very much like stuffed birds in a show-window. Merely by sticking out his hand, Noroy was easily able to seize a bird which had been flying low. Its body felt warm and supple, and when he released it, it retained the imprint of his caress.

Leaving the birds, Noroy directed his steps once more toward Esprels' house. On entering the main room on the ground floor he had the impression that he was in the castle of the Sleeping Beauty. The inhabitants of the old farm, like those of his own house, seemed petrified. In front of the high fireplace a servant, sitting on a stool, was holding on her lap a coffee grinder which turned no more. Not far from her a farm-hand was lifting a sack of potatoes which he evidently wanted to empty on a wide table over which he was leaning. But the sack, which had been raised a few inches off the floor, had stiffened in its place, and for all his efforts the poor fellow was unable to raise it an inch higher. Noroy couldn't



"Noroy was easily able to seize a bird . . ."

help grabbing it by the bottom and emptying the potatoes on the table. But the farm-hand didn't change his position one bit. He remained immobile, and continued to squeeze the top of the sack which now was as light as a feather. His vacant stare made it clear that he did not see the person who had just assisted him. Noroy then moved softly toward the servant, who likewise did not see him. Gently he took the coffee grinder out of her hands, turned it for a few moments, and then carefully returned it to her. Smiling to himself, he then left the room and climbed the staircase which led to the first floor.

Noroy knew that he had to pass through Lina Esprels' room in order to reach his friend's study. It dawned on him suddenly that he could easily play a trick on the girl. As he entered her room, Lina had just left her typewriter on which she had been typing a letter, and was pouring a brown liquid into a cup which lay on the hearth. Two drops had left the small phial in her hand—two drops which were floating in the air halfway between the phial and the cup. Lina was gazing at these drops without budging. Nor did she show any sign of movement when Noroy sat down at her desk and finished typing the short scribbled note which lay beside her typewriter. When he had finished, the professor got up, lifted the still empty cup from the fireplace, and carried it into Esprels' study.

His old friend was still leaning over his telephone. His hand was clenching the receiver and he was smiling skeptically.

"The statue of cynical doubt," thought Noroy. "But soon you will doubt no more, my fine fellow."

Then he crushed a pastille B between his teeth.

Immediately the world around him began to move again. Outside the window he saw the snowflakes swirl once more in the wind, and the "statue of cynical doubt" suddenly came to life.

"For God's sake!" shrieked Esprels. "How did you get here? Unless I'm crazy, just two seconds ago I heard your voice at the other end of the wire. You . . . you just hung up and . . . here you are!"

"It took me less than a second to cover the distance that separates your house from mine," replied Noroy. I am astonished to see you so surprised. Will you admit now that . . ."

He couldn't go on. The door of Esprels' study had

just opened and Lina came in. She looked pale and quite upset.

"Father, what's going on?" she stammered. "Do you hear those shouts?"

As the two men cocked their ears they heard a frightful din on the ground floor. Esprels leaped to his feet and ran as quickly as he could down the stairs into the main room.

As Noroy tried to comfort Lina a flock of black-birds swooned several times in front of the high windows of the study. The birds seemed terribly frightened as they cut madly through the avalanche of snowflakes. They flew round and round the house, and their frantic cawing drowned out the wail of the storm.

"And now those birds," Lina moaned. I have never seen them fly in such weather. Some diabolic apparition must have terrified them."

The girl's glance fell on the cup which Noroy had placed on Esprels' desk. Immediately she covered her face with her hands. "Oh! I think I'm going mad," she wailed. "This cup disappeared while I was preparing my father's medicine. And now it's here in this room."

"Take it easy, Lina," Noroy said. "There's nothing diabolic about what's frightening you. When you sit down in a little while in front of your typewriter, you will notice that it has worked without you . . . all by itself . . . or at least it will seem so. Let me assure you that before long these phenomena will no longer surprise you."

"But," the girl asked, "where did that whistling come from which nearly broke my eardrums?"

"I was moving very quickly," the scientist answered, "and it was probably I who . . ."

Esprels came into the study and interrupted him. "You've played some neat tricks, Noroy," he said while laughing. "I found Bernard stretched out on the floor of the main room downstairs. He swears that the potatoes jumped on the table all by themselves. As he was preparing to leave them out of the sack, he fell backward and nearly killed himself. My servant Eugénie also had a very strange experience. She was getting ready to grind some coffee near the fireplace when she suddenly felt the grinder getting hot in her hands. She noticed the the drawer of the grinder was full of powdered coffee and that all the beans had disappeared. At least that's what she says. . . . I'm sure, Noroy, that you are at the bottom of all this. I'll have you know that you've made my servants go completely mad!"

"I thought I was going crazy too, father," Lina said, "when I noticed that the cup which I had prepared for your medicine had suddenly disappeared under my very eyes. I just found it on your desk—and my head's in a whirl."

"Pull yourself together, Lina," ordered Noroy. "You know the nature of the research that your father and I are doing together. You have just witnessed the first test of our new H.S.M."

"I am intrigued and delighted," said Esprels. "What did you feel?"

"Let the professor speak, father," Lina begged.

"At the very moment when we were finishing our telephone conversation," continued Noroy, "I swallowed a *pastille A of hexo-styro-molybdenum*. It is really an extremely invigorating product. As soon as I had taken it I felt my strength growing tremendously and I knew that my self-confidence was growing also. I sensed that my physical and intellectual powers were going to be multiplied by an enormous coefficient, and I experienced no malaise, no

agitation, and no fear. I'll skip the surprising sights which the outside world offered me . . . you will see them all when you take some H.S.M. in your turn. Without realizing it at all I was moving at a prodigious speed. I went from my study to yours, my dear Esprels (taking time out to play a trick on your servants and to type your charming daughter's letter) . . . I repeat, I went from my study to yours in . . ."

Noroy paused here, and then continued while stressing each one of his words:

" . . . in one hundredth of a second!"

DURING THE 500,000 years that man has been on the earth he has been troubled and puzzled by the mysterious problem of the passing of time. We can come and go at our will in space, standing still or moving backward and forward. As far as time is concerned, however, it's an entirely different story. Time is an immaterial and impalpable entity which sweeps us along like the force of an onrushing current. It is unswerving, relentless, and consumes with equal indifference the great and the small, the king and the beggar. It is as headstrong as the waters which rush through the hidden canals of a hydroelectric plant.

To stop time . . . to bring the world to a sudden standstill like a movie film which abruptly stops short—has long been the dream of man. And this is what Professor Claude Noroy had almost succeeded in doing. We say *almost*, because the immobility had not been complete: the bullet which had been fired at Marandon had moved toward the scientist's breast at an incredibly slow speed, *but it had moved*; and the snowflakes had continued to fall imperceptibly toward the ground.

It was almost by chance that Noroy discovered the properties of his remarkable chemical compound, hexo-styro-molybdenum. As everyone knows today, this compound is formed by the substitution of three atoms of molybdenum and three styrolene radicals in the benzene nucleus. Noroy's *tachychronogene* is not toxic; it acts on the atomic structure of the human being, producing the "Einstein effect." It alters Lorentz's relationship (*continuum space-time*) for the subject alone, who finds himself almost entirely liberated from the inexorable flow of time. Only for a brief period, however: for H.S.M. "steals" minutes, not hours. But the person who is completely free from time for a few minutes can do many things, while the rest of the universe awaits his pleasure!

Actually, the universe did not come to a standstill when Noroy swallowed his first H.S.M. A pill—a pill no larger than a flattened dry pea. It was in fact *his* organism, *his* muscles, *his* thoughts which picked up terrific speed. To borrow an expression from automobile lingo, Noroy was "*accelerated*" 100,000 times!

While one second slipped by for Noroy a bullet moved only 0.394 of an inch, a plane flew only 1.182 inches, and an express train advanced only an infinitesimal fraction of an inch. If Noroy had been able to remain constantly under the influence of H.S.M., to him it would have taken light a year and seven months to come from the sun, instead of the normal 8 minutes!

"Accelerated" 100,000 times, Noroy experienced more in one second than other men do in an entire day, since a 24 hour day consists of 86,400 seconds. Inasmuch as he remained unseen, moved at a fantastic speed, and was almost invulnerable, the scientist had believed himself endowed with a limitless power . . . until the day when some unforeseen phenomena

had rudely brought him back to fantastic reality.

If Noroy, under the influence of H.S.M. was accelerated 100,000 times, the things around him—and especially those which he had to deal with directly—were not. The glass that he thought he could put on the table, like everyone else, in a tenth of a second, contacted the table in a millionth of a second and shattered into a thousand pieces! When Noroy walked briskly his trousers were scorched because of the friction of the air. He couldn't run, slam a door, or throw a stone because if he did his jacket would have caught fire, the door would have caved in along with its frame, and the stone would have fallen in the neighboring county.

The bold experimenter had to take into account all of these dangers which were unknown to "time-bound" human beings, but which conformed completely to the laws of physics. However, Noroy rarely remained under the influence of H.S.M., until the effect of Pill A had worn off. To return to his normal state, he merely had to swallow *Pill B* which contained simply dextrose sugar—Q S—and hexopropaine whose capacity to dissolve styrolene is well known.

Such was the "chronoscopic" instrument which Professor Noroy had just perfected and which could be used in the future—depending upon the hands into which it fell—for the good or misfortune of humanity.

(Extract from the report written by Claude Noroy, professor at the Collège de France to General Favre-Perronet, chief of the army general staff, director of the Dodecagon, and president of the council of national defense.)

Dear General:

I believe the time has come to furnish you with the explanation to which you are entitled and to thank you for the help—as involuntary as it was—that you have given me.

"No one is a prophet in his own land" . . . Marandon told his colleagues that sea water would soon be our principal source of fuel. No one wanted to believe him. However, people in Washington, in Moscow, in London, and in Nuremberg got wind of his research and were quick to see its importance. Here are the names of those foreigners who are now in our country and who are interested in the discovery of "combustible sea water": Venceslas Altkim of Russia, Clarence Walker of the U.S.A., Samuel Rides of England, and Otto Falkenberg of Germany.

Samuel Rides has never hidden his keen desire to come to an understanding officially with Marandon. He even claims that he can supply Marandon with *additional* information which would perfect his discovery.

After Marandon showed them to the door, Otto Falkenberg and Venceslas Altkim turned to me and asked me to give them any information about this discovery which meant so much to them. They had at their disposal large sums of money and unorthodox ways of persuasion; they were also backed up by powerful organizations. When I saw that they would stop at nothing I denounced them to the Government. Everyone in official circles merely laughed in my face!

As it is dangerous to be right all by oneself, I thought that perhaps the best thing to do was to play along with these two foreign agents. I pretended to be interested in their propositions, to be lured by their gold and frightened by their threats.

You must understand right from the start that Walker, Altkim, and Falkenberg were interested in

Marandon's work for only one reason, namely, they wanted to prevent him from finishing it. What they wanted was not so much Marandon's discovery, but the complete destruction of that discovery. They were determined to see to it that petroleum remained "black gold," and were prepared to stop at nothing to prevent sea water from being used in motors as fuel.

Then Falkenberg and Altkim stopped bothering me. Walker made no pretenses and went so far as to threaten me. I knew then that it was just a question of time before Marandon would "mysteriously" disappear. I had friends among the chemists of the Aigopal laboratory near Nice. They informed me that suspicious visitors had been seen both on the laboratory grounds and in the city itself. These visitors, they further told me, had asked many questions concerning the work of Marandon's collaborators. I immediately alerted the regional internal security office and warned our friend Ardouin, the minister of the interior, to be ready for trouble. I still don't know what precautionary measures the Government officials at Nice took to stave off disaster. From the looks of things they probably didn't take any. . . .

I decided to do what I could personally to save both Marandon and his precious discovery. To tell the truth, I would certainly have failed in my undertaking if I had not had at my disposal the compound hexo-styro-molybdenum whose remarkable properties I shall briefly describe to you.

This marvelous compound allows me to live in one second as intensely as you do during a whole day. It is an enormously powerful excitant which accelerates both my mind and my body and permits me to move with so great a speed that the world seems frozen around me. I must add that I personally am never aware that I am moving at so tremendous a speed. But I often find it quite painful to move through a totally motionless world and to walk among people who have been transformed into blind and frozen statues.

Don't laugh at me, my dear General. You may be sure that I am telling you the truth. I promise you that you may try out the compound H.S.M. whenever you want to. Moreover, our friend Pierre Devaux has drawn up a short description of this "tachychronogene" which you will find attached to this report.

My son Gilbert informed me a few days ago that Marandon and his nephew were planning to fly to the Aigopal laboratories in order to undertake the decisive experiments on converting sea water into fuel. They had indeed already reserved seats on a plane bound for Nice. I immediately decided to travel with them; I was dead certain that the dangers which threatened Marandon would soon materialize.

I asked Gilbert and two of my friends to accompany me to the airport and to watch over Marandon right up to the time he climbed into his plane. They noticed nothing unusual, but nevertheless called my attention to two men who were carrying valises, but didn't seem to be going anywhere. Neither their manner, nor their walk, nor their words, nor for that matter anything about them seemed suspicious, but after watching them for a few minutes it was clear to me that they were waiting for someone.

At first I thought they were plainclothesmen. To make sure, however, I slipped away from my companions and swallowed a capsule containing H.S.M. I determined to establish the identity of these suspects and to examine their baggage. I was curious

to see whether their valises had weight, like those of the other passengers, or whether they were empty cases which they carried solely in order to avert suspicion.

Now the smaller of the two valises, which they had placed on a nearby bench, was quite heavy. The larger one, however, was extremely light, for the simple reason that it contained nothing. It was lying on its side, but on turning it over I noticed that the side which had been face down had been almost entirely removed. Only its thin metallic border still remained. I noticed that the inside of this valise was lined with sharp points which jutted out from the sides which were still intact.

I now knew enough; prudence cautioned me to watch these two men attentively. I returned to my normal state by swallowing a capsule B. Then I rejoined my companions and urged them to keep a careful watch over the two men whom I had just investigated. To my great surprise the latter seemed to take no interest in Marandon. Instead they riveted their eyes on a rather insignificant looking traveler who had just arrived and was now pacing up and down. The traveler in question aroused my curiosity no end when I noticed that he was carrying a valise which resembled in every respect the smaller of the two I had just examined. Both were green, both were the same size, and both had become worn in exactly the same places.

I sensed that one of these valises would soon be substituted for the other. I was right. A minute later I saw the substitution take place under my very eyes. I won't conceal from you, General, the identity of the traveler who was duped by these two shrewd criminals. It was François Ledaim—yes, the very self-same François Ledaim who was arrested shortly after the explosion at Le Bourget and whom the police had to release for lack of evidence.

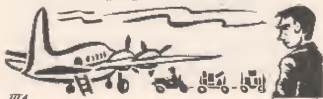
The poor fellow waited for his plane without realizing how close he was to death!

The two men whom I had been watching waited until they saw Ledaim stop pacing, place his valise on the ground, and search his wallet for his plane ticket. Then they sauntered over to him and casually asked him for the time. As he looked at his watch one of the thugs swiftly covered the salesman's valise with the large valise whose side had been removed. In an instant Ledaim's valise had vanished completely from sight. Almost in the same instant the green valise, which the two renegades had brought along, was slipped near his feet. Unaware of what had happened Ledaim, after supplying the information which had been asked of him, picked it up, and went off to have it registered.

The two thieves then turned around and carried off the big valise which contained Ledaim's. I suppose that some ingenious system, operated from the wrist, had made the points, which had attracted my attention a few minutes before, to shoot out. These points then had dug into Ledaim's valise and had gripped it rapidly and without the slightest difficulty. The whole scene had not lasted five seconds!

Of my three companions Gilbert alone had noticed the substitution.

"What are we going to do?" he asked.



I didn't hesitate long. I had made up my mind to protect Marandon and to save him if need be. The old man was already advancing toward the flight field. I had no time to lose.

"Nothing for the moment," I said. "Let's follow Marandon."

The plane had just rolled out on the field. Rubber-wheeled wagons were racing along the ground, carrying the passengers' baggage to the *Languedoc's* luggage compartment. I saw the green valise, which Ledaim believed was his, pass by on the last of these wagons and I couldn't take my eyes off it. . . .

The man who was loading the baggage into the plane's fuselage grabbed it clumsily, and nearly let it fall to the ground . . . I thought my heart would stop. . . .

Suddenly it dawned on me that these two suspicious characters were not thieves; it wasn't Ledaim's valise that interested them. *Their job was to see to it that the green valise was in the plane when it took off.* Realizing the dangers that confronted Marandon I could easily guess what this valise contained. I had to act quickly.

"The green valise is full of explosives," I said to my son. "The plane will certainly be destroyed in full flight if I don't intervene. I want to know exactly what that valise contains, and if my guess is correct I shall destroy the bomb immediately. I have good reasons for doing that. I want you to be ready and to sound the alarm at the right time, but be careful that no one sees you do it. Be on your toes. We are all in danger of death."

Perhaps you think, General, that I could have saved Marandon by using less spectacular means. Perhaps you think that I ought to have informed the airport authorities that there was a suspicious looking valise in the *Languedoc's* baggage compartment. In doing this, however, I would have, without fail, attracted the attention of Marandon's enemies. It was going to be a long and tough fight, and I wanted to stay out of their sight as long as I thought I had a chance of success.

Above all, I had to convince my stubborn friend to call off his trip. As he prepared to climb the steps which led into the fuselage I strode up to him and grabbed him by the arm.

"If I were in your place, Marandon, I would give up this trip," I said to him. "When you know . . ."

Suddenly I sensed that the people around me were listening.

"The weather isn't good over the Massif Central," I continued. "The weather bureau says that there will be storms over that region."

Marandon's only answer was to laugh in my face. I could see that the passengers who had overheard me were also highly amused. I hesitated no more.

I walked around the plane as if to examine it at my leisure. Then, when I was out of sight, I quickly swallowed a pill A of H.S.M. The world around me stood abruptly still once more. Without rushing, I threaded my way among the immobile passengers, slipped in front of the workman who was preparing to close the door of the plane's baggage compartment, entered it, and laid hold of the green valise.

Don't forget that I was actually moving at a tremendous speed and that my strength had been increased enormously. As you can well imagine the rapidity of my movements prevented the people who were standing on the field from seeing me. Only the whistling sound which I produced as I tore along could have revealed my presence to anyone who knew my secret. But of all the people assembled

near the plane only Gilbert knew the nature of my discovery. I myself slowly closed the door of the baggage compartment. For all my care, however, it slammed hard and caused the jolt of which all the witnesses have spoken. Then I carefully opened the green valise, examined its contents, and experienced a mixed sensation of joy and bitterness. I was happy to note that I had not been wrong: as I had suspected the valise contained a time bomb which was set to explode while the plane was in full flight. However, if on the one hand I was satisfied with my clairvoyance, on the other I was furious with the two men who had endangered the lives of so many innocent people. In planning to wipe out Marandon and his secret, they had thought nothing of killing at the same time all of his fellow passengers! I now knew that our enemies would stop at nothing to get what they wanted. I gritted my teeth grimly at the thought of the bitter struggle which lay before me. Then I angrily picked up the valise and walked rapidly toward the landing field which now was completely empty. I threw it as high as possible into the air toward the center of the field. Then, while it was still in the air, I rushed back to the plane. Before returning to my companions I swallowed a pill B. A fraction of a second later I saw the Nice-bound travelers drop fearfully to the ground. Gilbert had just sounded the alarm!

"Get down, everything is going to blow up!" In my haste to slip back into the crowd unnoticed I didn't hear Gilbert shout, but the terror-stricken faces of the people around me were ample proof that he had followed my instructions. You know the rest: The terrible explosion . . . The inquest without results. . .

Marandon's stubbornness forced me to share other dangers with him. Fortunately, I was always able to protect him. I shall now tell you the details of the three other incidents.

I BOARDED THE SECOND *Languedoc*, which was placed at the disposal of the Nice-bound travelers, without apprehension. Numerous mechanics and several policemen had carefully inspected the plane, and I had a hunch that I would have nothing to fear for Marandon during our two-and-a-half-hour trip. Just to be on the safe side, however, I switched lunch boxes with my old friend and refrained from eating during the entire journey.

On the other hand the precautions that I took shortly after our arrival at the Nice airport were not in vain. If you remember Marandon's story, you know that an automobile was waiting for him as he climbed out of his plane. This powerful limousine attracted my attention immediately. I also noted the chauffeur and a doorman standing nearby. These two men seemed nervous and ill at ease. They didn't look at all like trained servants who were waiting for their master; however, as soon as they saw Marandon and his nephew, who were walking behind me, they pretended to be such. The chauffeur sat stiff and impassive behind the wheel and the doorman bowed servilely before the open door.

As I watched these two men I suddenly realized that they fitted the description of two suspicious characters who, according to my Nice correspondent, Sarlat, had taken an unusual amount of interest in the activities of the scientists at the Aigopol laboratory. The time had come for me to swallow another capsule A of H.S.M. I continued walking, slipped behind a parked car, and downed one of them quickly.

By this time I thought I had steeled myself against all surprises. The world, deprived suddenly of life and movement, could no longer astonish me. However, at the very instant that the drug acted on me, a plane was grazing the tops of the trees, and getting ready to land. I was startled to see it stop short in mid-air and become silent. Even the propellers no longer moved. At this moment I became aware more than ever of the incredible rapidity of my thoughts and of the fantastic speed with which I moved while under the influence of H.S.M.

The scene that I am going to describe to you seemed to me to last for three or four minutes; actually it took me only an infinitesimal fraction of a second to accomplish what I set out to do.

First I examined the car carefully and noticed that an ingenious mechanism on the dashboard permitted the driver to lock all of the doors at his will. I further noticed that, unlike most cabbies, the driver was carrying a Luger, while his companion had concealed a revolver in a leather holster under his jacket. I could never have forgiven myself if I had allowed Marandon and his nephew to get into that car. I closed the open door as gently as I could with a flip of my finger. Not gently enough, however. To the amazement of everyone who was standing nearby it slammed with a violent bang and the glass of its window shattered into a thousand pieces. For my part, I watched the broken window being ever so slowly transformed into a glass mist which remained in place in the window-frame of the door.

Then I decided to teach the two villains a lesson they would never forget. I gave the one who was standing near the car a light jab in the stomach and only tapped the skull of the driver with the tip of my finger. The poor devils were almost crippled by the blows. The former man thought that someone had punched him with all his might, and the latter, that a sledgehammer had fallen on his head. If it had not been for the marvelous properties of hexo-styro-molybdenum I would have, in all probability, painfully bruised myself.

Naturally I didn't see either of them fall until I had swallowed a capsule B of dextrose sugar—Q-S—and hexopropane, which slowed me down and allowed me to see people and things as they really were. It was dangerous, General, and you can understand why, to fill my system twice during the same day with so powerful a drug as hexo-styro-molybdenum. But under the circumstances I had to do it.

While everyone was standing around the two men whom I had nearly maimed, I stepped up behind Marandon. The sweat was pouring from my brow and I was extremely tired. That's why I wasn't able to do much to prevent the would-be kidnapers from escaping. Marandon was now convinced. He realized that his life was seriously endangered and from that time on he followed all my advice. We hurried to Nice and took refuge in the home of our friend Sarlat. Sarlat convinced Marandon that he had to be extremely careful and advised him to return as quickly as possible to Paris. At long last I had the chance to safeguard for France the fruits of Marandon's labor!

This chance, however, was small. I didn't dare inform the police for fear of arousing the curiosity of the members of the press. I shuddered to think what might happen as the result of their indiscretion. Everything considered, I preferred to do things on my own.

While we were still at Sarlat's home, Marandon barraged me with questions. After admitting that I

had saved his life at Le Bourget and that I had put to flight at the Nice airport two of his most dangerous enemies, he wanted to know by what strange means I had protected him. I evaded all his questions.

I come now to the story of our trip home. As you know it was uneventful until our express train stopped in the little station of Thénisy. Putting aside all false modesty, I think that you have read my report up to this point with interest; you can easily imagine then by what means I got rid of the men who tried to kidnap Marandon from under my very nose. The H.S.M. performed miracles once more.

Having had twenty-four hours of comparative rest, I felt myself capable of tolerating the effects of another capsule A. The stopping of the train had just awakened us, and a glance down the corridor of the car made me realize immediately the gravity of the situation. Young Thévenet was stretched out on the floor and Marandon was being threatened by gunmen.

I crushed a capsule between my teeth at the very moment when Marandon angrily brushed his enemies aside and leaned over his unconscious nephew. The pill worked with lightning rapidity and I saw all of the actors of this violent scene suddenly freeze. Once more I was to play the rôle of champion!

Permit me to repeat that while under the influence of H.S.M. I had no exact idea of the rapidity of my movements, of my reflexes, and of my gestures. As before it seemed to me that my friends and my enemies had been suddenly petrified by some evil genius. I noticed nothing abnormal in my reactions to the world around me. The H.S.M. allowed my body to adapt itself immediately to the tremendous efforts that I was about to demand of it.

Just I should break every bone in his body I seized the first of Marandon's attackers gingerly, carried him gently to the other end of the compartment, and tossed him out of the open window. Without stopping to look at his inert body which, without my support, continued to float in the air over the heads of his gang, I proceeded to dispatch the second thug in the same manner. Then I rushed back to my compartment, swallowed a capsule B, and opened my window. Leaning out I saw one of my victims fall on his accomplices while the other, whose coat had been caught in the window knob, was struggling desperately to free himself.

I had thought that my intervention would frighten our attackers out of their wits. The success of their enterprise demanded speed and silence; the slightest noise or delay would attract attention to them and force them to take to their heels.

But these fellows weren't so easily scared. Without even wondering what strange and superhuman force had hurled their friends out of the coach, the men on the platform pulled out their guns and aimed them at Marandon's compartment. To my dismay Marandon chose this very moment to lean out of his window and to make himself a perfect target.

I had little time to act. Quickly I gulped down another capsule A of hexo-styro-molybdenum. I was angry, and I swore that this time I wasn't going to spare my punches. As the exterior world froze into a state of immobility I hurriedly descended to the platform of the station in order to get rid of our adversaries once and for all. As I approached them, however, I felt my anger subside and I decided not to do away with them after all. It would be better, I thought, to sow confusion in the enemy's ranks and to allow these scoundrels to escape and make a report to their chiefs of their terrifying adventure. In a word, I was going to make their hair stand on

end, but at the same time allow them to see and remember what happened to them.

Before laying hold of them I went around their little group and pinched their noses and ears with my fingers which had been strengthened by the drug. I imagine that they were pretty badly bruised when I finally carried them at breakneck speed to the end of the station. To tell the truth my strength had been so enormously increased that I thought I was carrying paper dolls. They seemed to have no weight at all. As soon as I had reached the head of the train I dumped them on an embankment covered with thick grass. I chose this spot deliberately, knowing that the grass would break their fall and not their bones.

When I seized the last of the attackers, the one whose coat had caught in the window knob and who was still dangling in mid-air, I decided to make an experiment. I walked backward toward the head of the train holding his hand with the tips of my fingers. His coat tore away from the window and he followed me, floating horizontally in space. When I arrived at the spot where I had left his companions, I saw that they too were still suspended in the air. Not one of them had fallen to the ground.

I left them then and returned to my compartment. Once there I hastily swallowed a neutralizing capsule B and hurried next door to see how Marandon was getting along. I found my old friend choking with rage and emotion and on the point of losing consciousness. I comforted him as best I could and revived his nephew. As you know, the train pulled out soon after without further mishap.

I can still hear Marandon telling you at the *Dodecagon*, General, the strange events which took place at the station of Thénisy.

"Mind you, they weren't running away," he said speaking of his attackers. "No . . . they seemed to melt suddenly into the air. In less than a fraction of a second they were no longer there . . ."

If you remember as I do the words of our dear colleague and if you will only believe what I am telling you, you will have a good idea of the strange and tremendous power that a person has while under the influence of H.S.M.

During the frightening scene, which I have just related to you, time seemed to pass normally for me. I reckoned that it had taken me a little more than a quarter-hour to dispose of our enemies. It seemed to Marandon, however, that they had been whisked away in the twinkling of an eye.

The nearer we got to safety at the *Dodecagon*, the more I was tormented by anguish and anxiety. Above all, the *Gare de Lyon* with its continuous coming and going of travelers frightened me, and as soon as the express stopped I kept a sharp lookout and placed between my teeth a gelatine capsule containing H.S.M.-A. It was a good thing I did. The very moment that I saw Marandon's would-be assassin step out of the crowd I crushed the pill and gulped down its contents. *The gun fired just as the H.S.M. took effect.*

This was the first time that I noticed, while under the influence of hexo-styro-molybdenum, that everything was not immobile around me. An object was moving whose speed could be compared to my own, and that object was the bullet which was gliding toward Marandon. It advanced slowly, turning round and round, toward my poor friend's chest. So slowly, indeed, that I could easily have seized it between two fingers. And that is what I would have done if I had not remembered just in time that *this bullet was burning hot*. Instead then of scorching my hand, I placed the heavy briefcase that I was carrying in

the bullet's path. I saw it pierce the thick leather and embed itself in my notebooks where it disappeared completely. Inasmuch as it had spent its force digging into my papers, it remained stuck in my briefcase where I found it a few minutes later.

I took the trouble to search our assailant, but might just as well have saved my energy. His wallet contained a lot of money, but no papers which could tell me his name, where he came from, or the names of his chiefs. Then I struck the killer lightly with my fist, certain that my blow would knock him out until the police came and took him away. This done, I swallowed a capsule B and slipped back into the crowd, taking care not to jostle anyone. My ear-drums were nearly shattered by the shouts and the cries of the frightened spectators who were standing around us. In no time, hell had broken loose throughout the station, and I thanked my lucky stars that no one had seen me vanish or disappear. In the confusion the gunman, who was young and stronger than I had thought, staggered to his feet, mingled with the crowd, and made his escape.

NOW FOR THE last part of my story . . .

As you probably suspect by now, General, I stole your key as well as Captain Mallefeux's and Colonel Maillard's while you were sitting, petrified and silent, in the Sphinx room. All those who were present on that memorable day in the Sphinx room will be remembered by posterity. That's why I thought while looking at you—and I hope you'll forgive me—of the wax figures of our great men in the Grévin museum. As far as I was concerned, you were at that moment no more alive than they are.

According to you, the steel door which guards the strong-room cannot be opened unless its three locks are released simultaneously. Is that really true?

In a pinch I could release two of them at the same time, but three . . . ?

I won't keep you in the dark any longer, General. Here is what I did. Without rushing, I turned the first key in its lock, then the second, and finally the third. Nothing unusual happened, because *all three locks were released during the same hundred-thousandth of a second!*

Naturally I placed the three keys in the keyholes near the bottom of the massive door in order to prevent your machine guns from firing. But even if they had, their bullets would never have hit me. I would have seen them advance slowly and I would have been able to draw back in time. Having disposed of the keys I applied the radioactive condenser to the door without the slightest difficulty. It did the trick, and the door swung open. To be frank, I must admit that I nearly forgot to turn the security dial to zero. Fortunately I remembered in time and the vaults escaped being flooded by tons of water.

I can still see our good friend Dubourdieu standing with his chronometer in his hand and saying: "It took just six and a half minutes to open it . . . That's a record! Usually it takes us eight minutes." You know now that it can take infinitely less time?

I purposely left the huge door of the strong-room open: my ears were humming and my heart was beating hard. I am now certain that anxiety and other emotional disturbances added to the effects of H.S.M. are responsible for these discomforts.

I was afraid that I would faint soon after swallowing a capsule B. Then I thought that it might be a good idea. It might be prudent, I reasoned, to look

upset when I returned to my normal state. As a matter of fact I did faint for a short time, as you know.

Except for seeing the steel door open, you did not notice my interference. If I had taken care to close it again you would have had reason to say that someone had entered the strong room and stolen Marandon's documents without having recourse to the door. Indeed you would have been forced to conclude that the thief had made his way into the vaults by passing through the walls!

As the steel door swung open you were at first unwilling to believe what you saw. Then you became panic-stricken, and in the ensuing confusion I had all the time I needed to return to my place without attracting attention. Weakly I fell back into my chair.

I had achieved my end. The disappearance of Marandon's formulas would prevent any immediate negotiations with Sir Samuel Rides. I was certain that the Englishman would offer nothing in return for secrets which had been so badly guarded. You know, General, that Rides, for his part, knows important secrets concerning catalyzers, and that Marandon himself—before he was felled by a stroke—was quite sure that he would have to collaborate with British scientists in order to perfect his invention.

You will ask me, General, how it was that the precious documents were not found on my person when your officers searched me. Can't you guess? Among the people who were present in the Sphinx room on that day, only one escaped being searched and it was precisely he who carried Marandon's documents out of the *Dodecagon*. *That person was you yourself, General!* Think for a moment . . . I couldn't have opened the safe containing the green portfolio without knowing the combination of the lock. Where did I find it? In your wallet!

Perhaps you remember that when I fell back into my chair I turned my head toward you. I saw you clutching your chest and looking very pale as if you had just received a violent blow. Pardon me, General, but I just had to get the combination of that lock, and despite all my precautions I probably struck you while borrowing your wallet prior to entering the vault. Before the investigation began I stuffed the combination and Marandon's documents into the wallet, and, without your noticing it, slipped it back into your pocket.

Virevolta-Larose, I remember, was screaming at the top of his voice and harrying me with questions, but I didn't bother answering him. I had then only one concern: to oblige you to take me home.

In your car two capsules, one H.S.M.-A, then B allowed me to lift the documents from your person. The next day the mailman dropped on your desk a thin package which contained your wallet. I kept it only for a few hours so that you would notice its disappearance and not doubt the rather astounding story that I am telling you today.

During the next few weeks I am going to act in such a manner that the Government will no longer be able to doubt the fantastic properties of hexostyromolybdenum. When we reach that point, even the most cynical and incredulous officials will listen to me and we will be able to champion Marandon's cause. As soon as you think that you have convinced them in some measure, tell the morning newscaster to broadcast these simple words:

"Good news, Noroy! . . ."

The next day I shall be with you.

(End of Claude Noroy's report to General Favre-Perronnet)

(End of Part One of "The Stolen Minute")

(To be continued next month)

science news shorts

astronomy

The Moon's Thin Atmosphere

When man succeeds in flying to the moon, he will have to take his own air (or its equivalent) along with him. The moon, however, has a breathable, although very thin, atmosphere, according to Dr. Harlow Shapley, of Harvard College Observatory. The tenuous atmosphere on the moon consists of little more than a few whiffs of argon. Dr. Shapley warned that this very thin "air" found on the moon would not be very "sanitary" to breathe, as argon results from the radioactive decay of a potassium isotope in rocks forced to the moon's surface by meteoric bombardment.

Only about 1 percent of the Earth's atmosphere is argon gas. Lighter gases (argon is quite heavy) like hydrogen, nitrogen or oxygen, which might be released by meteoric bombardment of the moon, would probably escape into space (due to their lightness). The moon's atmosphere might also contain other noble gases like krypton and xenon.—*Science Service.*

Scintillation of Radio Stars

The intensity of the signals picked up from radio stars frequently show surprising fluctuations. The cause of these variations in the signals has been a mystery. One theory attributed the fluctuations to variations in the strength of the emissions from the stars themselves. In 1949 a series of experiments were conducted in which the Cygnus and Cassiopeia sources were observed simultaneously with identical receivers. The records of the fluctuations in the signals intercepted at two different stations proved to be quite dissimilar. This would indicate that the fluctuations did not arise in the sources of the signals. Later researches have disclosed that the fluctuations occur whenever the radio waves have to pass through the upper F region of the ionosphere (at an altitude of approximately 240 miles), and that the change in signal strength is caused by diffraction by electron clouds several miles in extent. These electron clouds move at high velocities through the upper layers of the atmosphere.

The speed and direction of the diffracting medium can be checked by comparing the fluctuation records on three suitably spaced radio receivers. One explanation for the irregularities in the signals is that they may be due to the accretion of interstellar dust. Another theory offered is that they may be due to the breaking up or granulation of the F region. It was noted that where the radiations pass through the auroral zone, fluctuations are usually present and that they presumably must be due to the very disturbed ionospheric conditions caused by the aurora in the upper regions of the atmosphere.—*Sky and Telescope.*

astrophysics

Ozone Layer Protects Life

High above the Earth (between 15 and 30 miles) there floats a thin, protective layer of ozone gas, which—unknown to the average individual—serves to keep him alive, and as well, plant and animal life. The ozone layer shields the Earth from the invisible ultraviolet rays. We need a limited amount of ultraviolet light to keep us healthy—it annihilates many germs—but if this ozone gas layer ever failed and permitted more ultraviolet light to reach the Earth's surface, practically all forms of life would die, according to William Hoover, astrophysicist at the Smithsonian Institution at Washington, D. C.

Thanks to old records of the amount of the sun's visible light received on Earth for a period of 50 years, the variations in the amount of green and yellow light received can be checked, also disclosing the amount of ozone in the atmosphere at various times. The ozone layer stops about 3 percent of the yellow-green light radiated by the sun to the Earth.

The ozone layer also blocks some infrared (heat) radiation from the Earth, and thus may contribute partly to the maintenance of the Earth's temperature.—*Science Service.*

anthropology

60-Million-Year-Old Fossil

Sixty million years ago, when tropical conditions existed in the present temperate North America, primates lived in the trees! The 60,000,000-year-old bones of a "dawn-age" primate found in Wyoming were recently sent to the Smithsonian Institution in Washington, D. C.

This prehistoric creature—a very rare find as bones seldom become fossilized in forested areas—possibly represent a link between monkeys and the lesser animals. The specimen found in Wyoming was a lemur-like animal, a species of the extinct genus *Notharctus*, and in size resembled a Rhesus monkey. It probably lived in the trees, said the Smithsonian Institution experts.

Fossils of primates in temperate North America are seldom found in any appreciable number, except in the dawn-age (Eocene) deposits dating back to sixty million years ago. The study of evolution on Earth is aided by all such discoveries, as the animal group of primates includes lemurs, monkeys, apes, and man himself. Thus it will be seen that to the paleontologist, such primate fossils are exciting bits of circumstantial evidence in reconstructing the human family tree.—*Science Service.*

atomic

Improved Nuclear Reactor

An improved homogeneous nuclear reactor which will have a much greater efficiency as a power source can be expected in the near future, according to an announcement by Dr. Clarence E. Larson, director of the Oak Ridge National Laboratory. The newest design of nuclear reactor holds great promise, said Dr. Larson, primarily because of its simplicity. It presents the newest approach to the efficient production of electric power from nuclear materials. In a recent test of this homogeneous reactor, a pilot model was put into operation and run up to its design power of 1,000 kilowatts output (of heat). Then the reactor was connected to a steam turbine-electric generator unit, and produced 150 kilowatts of electrical energy. This represented enough electrical energy to supply about fifty five-room dwellings.—*New York Herald Tribune.*

"A-Bomb" Blast Rebound

Recent discoveries by weather experts who checked the A-bomb test explosions in Nevada show that blast waves from such an explosion sometimes rise 50 miles (264,000 feet) into the sky... and—most frightening—the blast wave may bounce back onto the ground and strike objects or buildings 600 miles distant! Reflecting surfaces which might cause such blast waves to bounce back to Earth comprise various temperature-inversions and the normal layers found in the atmosphere, such as the troposphere, the ozonosphere and ionosphere (the latter 50 miles up).

This discovery that A-bomb blast waves may bounce back to Earth and even be deflected in their course by high winds, etc., helps to explain why some of the force of the Nevada test explosions were registered as far away as California, Arizona, and Utah. A fair degree of accuracy has been attained in predicting the pattern of blast waves from a particular test explosion when the weather forecast has been accurate.

The blast waves that bounce back are concentrated and hit a focal point on the ground. Any object that happened to be at this focal point might be damaged or destroyed, depending on the amount of energy reflected.—*Science Service.*

Super-Atomic Energy

If the negative analogue of the proton (heart of the hydrogen atom) was discovered and made to combine with a proton, two billion electron volts of energy would be unleashed! This tremendous energy would be 1,000 times greater than that released by the annihilation of an electron, which amounts to 1,000,000 electron volts. These startling figures on future possibilities in atomic discoveries were cited by Dr. I. I. Rabi, Nobel Prize

winner in physics, of Columbia University, New York.

Dr. Rabi addressed the winners in the National Science Talent Search and discussed the possibility of obtaining vast amounts of energy from the annihilation of matter. He suggested to the young scientists that they help discover new ways to produce energy by investigating the action of particles of matter. In the future, said Dr. Rabi, we shall no doubt discover methods of producing energy which will far exceed those evolved by the fission of matter in the atomic bomb, or the conversion of hydrogen into helium (which occurs by fusion in the H-bomb and in the sun).—*Science Service*.

aviation

Jet Flights at 20,000 M.P.H.

Scientists today envision pilotless jet planes that can travel at the speed of 20,000 miles per hour! Such was predicted recently by Prof. Frederick K. Teichmann, head of New York University's Guggenheim School of Aeronautics. Unless some refrigeration method is devised to counteract the terrific heat developed by air friction, most metals now in use will be at least weakened. One metal that may solve the problem for future super-speed jet planes is *titanium*. Such high speeds call for jet engines developing about 500,000 pounds of thrust (about 125 times that developed by our present top-notch piston engines).

Such engines will prove of little value, however, unless engineers can find a way to overcome the great heat developed by the air friction when a plane attempts to fly at such speeds as those cited. Even at 1,300 miles an hour, a plane flying at 43,000 feet altitude may develop on its inner and outer surfaces a temperature exceeding 200°.—*Science Service*.

biology

Mixed Sex Among Mice

Scientists have found a surprisingly large number of *mixed sex* cases among white mice. Professors W. F. Hollander, John W. Gowen, and Janice Stadler, of Iowa State College, Ames, Iowa, recently reported their findings to a meeting of the American Association for the Advancement of Science in St. Louis, Mo. Whether the mice developed the *mixed-sex* specimens by the loss of one sex chromosome (as occurs in experiments with the fruit fly, *Drosophila*) is not known.

In the experiments made with a well-known and pure strain of white mice, the *mixed-sex* offspring had female structures on one side of the body and male structures on the other. Thus far, 17 of the *mixed-sex* specimens have been obtained, 3 of which were still alive at the time the report was made. Among those that died, one mouse showed *mixed sex* on one side; in the remainder the side which was *male* was on the left about as frequently as the right. In the strain as a whole of white mice studied, the *mixed-sex* specimens numbered less than one in one hundred. However, in matings producing the *mixed-sex* mice the rate of occurrence was approximately six in one hundred times.—*Science Service*.

chemistry

Tannates May Stop Rust

Rusting of iron pipes, such as are used for water and gas, may eventually be prevented. When iron relics 2,000 years old were discovered recently in ordinarily destructive soil at Hungate, York, England, chemical tests of the soil in which they were found disclosed that tannates from an ancient shoe factory had seeped into the ground, the tannates apparently preventing rusting of the iron.

Roman knives, hobnails, and other iron articles were well preserved, the destructive action of sulfate-reducing bacteria on the iron having been checked by the presence of the tannates in the soil. Experiments disclosed that even tannic acid concentrations as weak as one-hundredth of one percent stop the corroding action of the bacteria on iron. Experts in England's Department of Scientific and Industrial Research are hopeful that this new discovery will reveal a method of preventing rusting of buried iron pipes.—*Science Service*.

2,000,000,000 Years Ago

Conditions on our Earth two billion years ago comprise the objective of a present study in the laboratories of Ohio State University by Dr. Wollman M. MacNevin and his co-workers. They have set up electrical and chemical apparatus capable of reproducing effects calculated to match those existing on the Earth long before life, as we know it, existed. As Dr. MacNevin explained, one of the problems to be solved is to ascertain whether extreme complexity of chemical compounds developed *before* life appeared or whether this was the result of the life processes.

Lightning occurred almost continuously in the earliest days on Earth, and among the experiments being performed in the laboratory, a 100,000-volt spark was sent through a mixture of marsh gas (methane) and water vapor. This resulted in the production of resinous solids too complex for the chemists to analyze. Hydrogen peroxide was produced photochemically as a result of exposing water and oxygen to light after the chemists had added a small amount of zinc oxide and a trace of organic matter.

Porphyrin—which resembles in its basic structure the hemoglobin and chlorophyll of blood and plants—was produced by passing carbon dioxide, water, and ammonia over a heated silica tube. Aided by the heat from the Earth's surface, this chemical process probably occurred in the early days on Earth. Out of all this research, some practical applications of scientific and industrial value are certain to result.—*The New York Times*.

New Magnetic Material

A new material, extremely hard physically, but magnetically *soft* (i.e. easily magnetized), has recently been demonstrated by the Naval Ordnance Laboratory. It is known as 16-Alfenol and is an alloy of aluminum and iron. The metal is heated to 1,067° Fahrenheit, then passed through a cold-rolling process. The new metal, possessing superior *soft* magnetic properties, can be magnetized by a very minute electric current. The metal loses its magnetism quickly when the electric current is cut off.

16-Alfenol is often more useful than silicon steel, for it is lighter and has an insulating coating already on its surface when it emerges from the initial processing. The new alloy is said to look promising for use in high-frequency work.

For transformer cores it should result in the reduction of weight, and it possesses the virtue of offering high resistance to the undesirable electric current produced in the cores of transformers. It appears to offer excellent possibilities for use in magnetic tape recorder heads, as, due to its hardness, it cannot be worn down easily by the recording tape passing over it.—*Science Service*.

geology

The Earth's Core

New light has recently been shed on the age-old problem of the composition of the Earth's core. Prof. K. E. Bullen described a new method of studying the Earth's core-structure by noting the rate of transmission of earthquake waves through the different regions of the Earth's interior. At the *Australian and New Zealand Association for the Advancement of Science*, in Sydney, Australia, Professor Bullen, of Sydney University, declared that these earthquake waves vary in speed, according to the density and elastic properties of the material through which they pass. Various properties of the Earth's interior can be estimated by checking the arrival times of these vibrations at observatories located at various points about the Earth's surface. Some of the evidence thus adduced points to the fact that the inner central core of the Earth is solid, with a density at the center of about 18 times that of water. The inner core has a radius of about 800 miles. The outer part of the central core is thought to be fluid. The entire central core is believed to be about 2,200 miles in radius. Professor Bullen believes that the composition of the outer part of the central core is that of a high-density liquid form of silicate rock, having a density of approximately 11 times that of water. The inner core, he concludes, is chemically distinct and may consist of iron, nickel, and probably some denser metals.—*Discovery*.

medicine

Atomic Bomb Blindness

A recent survey of atomic bomb survivors at Hiroshima, Japan, made by Dr. Robert M. Sinskey, Lt. J.G., U.S.N., seems to show that the lenses of the eyes may be damaged by the radiation (even so severely as to cause *cataract formation*), but that the lens damage will probably not be severe enough to cause blindness. Dr. Sinskey said that his research was for radiation damage (probably neutron and gamma rays). It was impossible to say what damage would ensue from the explosion of the latest type atom bomb or a hydrogen bomb. Blindness from *heat* was not included in this research report. It was estimated that the atom bomb exploded at Hiroshima would prove blinding (due to the *heat*), even if the observer was stationed four miles distant, provided his eyes were focused on the bomb.

Only 2 of the 154 cases of radiation cataract found among Hiroshima survivors suffered such a loss of vision as to need an operation to restore their sight. Actually, Dr. Sinskey found more cases of radiation damage to the eyes in these survivors of the first atomic bomb explosion than had been previously reported. These findings were due to the more advanced technical apparatus he used in examining the eyes of the survivors.

It is interesting to note, the report states, that the radiation damage in the eyes of the survivors has not progressed in the past three years, hence, it was unlikely that the injury would progress so far as to cause future blindness.—*Science Service*.

Blood Vessels in Old Age

"You are as old as your blood vessels," has been a quasi-medical opinion for many years. Now further proof comes along that shows how the blood vessels change in old age; in fact, after the age of 20, small blood vessels in the human body become increasingly fragile. Tests reported by Dr. Daniel J. Perry, of the University of California, Los Angeles School of Medicine, and Dr. Irwin Linden, of the West Los Angeles Veterans Hospital, disclose that over 70% of normal people over 60 years of age have extremely fragile blood capillaries.

The tests were conducted by using a blood-pressure cuff which is fastened around the upper arm for a specific time. The fragility of the small blood vessels is then determined by noting the number of capillaries in the arm that rupture following the test. This is known as the Rumpel-Leede's test.—*Science Service*.

meteorology

Atmospheric Tides due to Moon

Imagine an amount of energy equivalent to one million atomic bombs! Fantastic as it may seem, this tremendous energy is stored in the atmospheric tides caused by the attraction of the moon on the Earth's outer gaseous envelope. It has long been known of course that the variations in the moon's gravitational pull on the Earth's waters causes tidal rise and fall. What scientists have not realized is that the moon exerts a strong tidal effect on the atmospheric layers enveloping the Earth.

The speed of these atmospheric tides (called *lunar winds*) is low, or about 1/20 of a mile per hour. They can be detected and studied by noting the changes required in the frequency used for good reception of long-distance radio signals under similar conditions, near the equator, where the lunar tides are strongest. These lunar winds occur both in the upper and lower layers of the atmosphere and rotate, if viewed from above, in a clockwise direction. They go toward the east in the morning and toward the west in the evening, according to A. G. McNish, of the National Bureau of Standards, who explained the peculiar effects of the lunar winds before members of the Washington Philosophical Society.

The moon's pull on the Earth's atmosphere causes high and low tide twice daily at one point, the same as in ocean tides, with high points similar to the ocean's spring tide. The extra-strong

variations in the lunar winds occur twice in every lunar month, 4 days after the new moon and 4 days after the full moon.

Vertical shifts in the ionized layers of the atmosphere occur also, the F-2 layer having been known to rise as much as 20 miles an hour. The ionized upper (outer) layers of the atmosphere reflect radio waves and variations in reflected signals thus enable scientists to chart variations in the layers, and also in the characteristics of lunar winds.—*Science Service*.

Star Twinkle and Wind

Scientists at the U.S. Naval Observatory and the U.S. Weather Bureau have discovered that *how fast a star twinkles* may indicate whether a fast wind at high altitude will be encountered, or the opposite condition.

Frank Gifford, research meteorologist, said recently that the faster a star twinkles, the greater the possibility that there is a fast wind at high altitude, and the slower the twinkle, the more likely there are slow winds at low altitudes. The star twinkle may show weathermen and airline experts where the jet stream is—this is important, as this extremely fast, very high narrow band of wind can slow a plane down to almost a stop. On the other hand, the jet stream could give a plane a helping push. *Wind shears* (vertical faces between two currents of wind moving at different speeds) are also linked with the twinkling of the stars, it appears. The greater the difference in speed, the greater the intensity of the star twinkling.

Radio stars also are said to twinkle and this fact is related to the speed and altitude of winds on the Earth. These radio stars are bursts of energy, invisible to the eye on the telescope, but which can be heard on certain types of radio receivers.—*Science Service*.

Fog Droplet Formation

The formation of tiny fog droplets has puzzled meteorologists for many years—now the answer seems to be at hand in experiments being conducted at the University of California at Los Angeles, by Dr. Morris Neiburger, Chien-wu Chin, and Henry Froula.

In studies thus far made, condensation nuclei on which the fog droplets form appear to be composed of tiny crystals of salt evaporated from ocean spray, which are left free to float in the atmosphere.

In the study being conducted the fog droplets are trapped on special screens, coated with an ultra-thin collodion film. Then they are photographed through a light microscope and later the evaporated remains of the fog droplets are photographed through an electron microscope, with its tremendous magnification.

The study discloses that sometimes life is to be found inside the droplets in the form of diatoms—tiny single-celled organisms. Water vapor must be present in the air in order for the fog droplets to form on the condensation nuclei, in the same manner as rain forms on nuclei, such as dust particles.—*Science Service*.

mineralogy

Zirconium and Industry

Until recently, zirconium, a rare metal, has not been available to design engi-

neers. However, a new process promises to make zirconium a better known product in the near future for applications such as pipes in chemical plants, various other chemical equipment, and for surgical instruments.

Zirconium has a high melting point, and it is resistant to corrosion by acids and alkalis. It is especially valuable for use in atomic energy plants, as it does not readily absorb neutrons and become radioactive. It will therefore aid in the design of nuclear reactors, since one of the big problems here is to reduce to a minimum the loss of neutrons.

A new plant for manufacturing zirconium will soon be put into operation at Akron, N.Y. A new secret process has been perfected for separating zirconium in its raw state from hafnium, another rare metallic element. In the final stage of the processing, the zirconium emerges in the form of a pure metallic sponge. It is believed that for ordinary industrial applications the zirconium-hafnium metal can be used without subjecting it to the separating process, as the 1.5% hafnium in the mixture should not present any particular commercial problem.—*Business Week*.

Synthetic Diamonds

Men have long sought an artificial gemstone which would outshine the diamond. Modern chemistry has at last solved the riddle and recently the National Lead Company announced the discovery of a synthetic stone, which experts have adjudged to equal the diamond. It has as great a brilliance as the diamond, and in fact it possesses more fire, according to Dr. F. H. Pough, former curator of geology and mineralogy of the American Museum of Natural History.

The new stone is strontium titanate, in the form of a large single crystal made by a flame-fusion technique. The chemical make-up of the new stone includes titanium, strontium, and oxygen. The compound, as developed in the laboratory of the National Lead Company by Leon Merker and Langtry Lynn, is not found in Nature.

The experts who examined the new synthetic gem stated that in whiteness it compares favorably with any stone, natural or artificial, now used in jewelry. It is also suitable for various optical uses.—*New York Herald Tribune*.

physics

Cosmic Ray Flashes

When cosmic-ray particles plunge from outer space into the Earth's upper atmosphere, they cause faint but distinct flashes of light. True, they may account for only a small fraction of the light observed in the night sky, but the presence of such flashes of light is particularly interesting to scientists. The effect was discovered by a Russian scientist, P. A. Cerenkov, who noticed the phenomenon in 1934. The radiation discovered by Cerenkov is blue-white light caused by fast-moving particles (such as cosmic-ray particles) plunging into a medium like the Earth's upper atmosphere.

W. Galbraith and J. V. Jelley, of Britain's Atomic Energy Research Establishment at Harwell, succeeded in measuring the short-duration light-pulses with special photo-multiplier apparatus. The

effect created by the cosmic-ray radiation is believed to be due to the fact that the particles travel faster than light in the same medium. Prof. P. M. S. Blackett, British Nobel Prize winner in physics, suggested in 1948 that the cosmic-ray radiation was responsible for approximately one-tenth-thousandth of the light of the night sky.—*Science Service.*

A New Particle: The Pion

The strangest and most newly discovered particles which fly out of atomic collisions and most of which exist only for a fleeting micro-fraction of a second, are the *pion*, the *muon*, and the *V-particle*. These were mentioned in a recent conference on High Energy Physics held at the University of Rochester. Some 20 or so particles either exist in or can be knocked out of atoms, some of these particles being *old-timers*, such as the electron, the proton, and the neutron. Leaders from about 50 atomic exploration laboratories discussed the action occurring within the hearts of the atoms. To explore these newer particles—the pion, the muon, and the V-particles—the scientists use the new giant atom-smashing accelerators, along with studies of the cosmic rays.—*Science Service.*

Einstein Revises New Theory

Prof. Albert Einstein has revised his generalized theory of gravitation. This may be a major step forward toward the goal of complete description of the physical universe—gravitational, electrical, and nuclear forces—by a single theory.

The revision is presented as an appendix to the fourth edition of Einstein's book, *The Meaning of Relativity*, published by Princeton University Press.

The revised theory runs directly against the main current of modern physical thought. It is a "field theory" rather than a "particle theory" such as is favored by most other physicists.

Einstein, however, sees "in the present situation no possible way other than a pure field theory, which then, however, has before it the gigantic task of deriving the atomic character of energy."

The idea of developing a generalized field theory has been a major goal of theoretical physicists since about 1920.—*Science Service.*

spatialogy

Space Suits Passé?

While the latest model space-flying suits appear to be effective, they may

soon be *passé* for combat purposes. The experts are already predicting that a human pilot, even when encased in a modern space-flying suit, is too vulnerable to damage from various rays and flying particles. The experts think that the space-flight machine of tomorrow will be pilotless and controlled from the ground by electronic brains and telemetering devices, in the form of *guided missiles*.

The Air Force experts at Randolph Field, Texas, have been investigating "space medicine" and they manifest doubts as to a human pilot yet being able to withstand the rigors of space flight, such as from the Earth to the moon. The loss of gravity experienced in space flight will seriously interfere with the human pilot's sense of balance, for one thing. Also, we know very little about the effects of cosmic rays that will bombard pilots in space flights. Whether the pilots and crew-men wore space suits or not, the effect of these radiations is problematical and not yet fully known.

Even at lower-level combat flights, it is conjectured that the pilots are too slow. For combat above 50,000 to 100,000 feet it is believed that such encounters will occur between guided-missile bombers and guided-missile fighters. In such guided missiles the speed could be increased or decreased at rates that no pilot in a *spacesuit* could withstand, and electronically directed fighters and bombers could make turns that no pilot could stand, even if he wore a space suit. In addition, the responses of his reflexes would be too slow.—*Science Service.*

Space Conditions in Laboratory

What can happen to electronic apparatus when traveling through space is being studied by means of a new test chamber built for the U.S. Army's Signal Corps Center, at Fort Monmouth, N. J. With this latest model testing chamber, nicknamed the "teakettle," temperatures down to minus 150° can be obtained. The chamber must be prepared for 24 hours to set up such freezing conditions; after that, it can cool at the rate of 50° per hour until it reaches minus 150° F. The chamber can heat up at the same speed it froze. Actually a *pressure cooker* in reverse, the new test chamber permits lowering of the air pressure within it until it is 1,000 times rarer than that found at the Earth's surface. Water can boil without becoming hot.

Scientists will be able to solve many meteorological problems with this new chamber as well as ascertain what actually happens to electronic and other equipment when subjected to upper atmosphere conditions.

How to build weather balloons to go higher than 140,000 feet and similar problems will be studied with new test cell.

The inner section is 10 feet deep, and 8 feet wide, and has a 7½-foot arched ceiling. It has an outer shell of nickel steel, with 12 inches of glass-wool insulation. The equipment permits the establishment of rapidly changing pressure conditions such as would be encountered in space.

The control equipment permits starting with 1,000 millibars (pressure at Earth's surface), then evacuating down to 100 millibars in approximately 2½ minutes, and lowering the pressure still further to the 1-millibar mark in another 2½ minutes.—*U.S. Signal Corps Release.*

technology

Titanium Lenses

Telescope and microscope designers have a new substitute for glass from which to make lenses. This is a titanium compound. A patent on the new compound has been issued to Leon Merker of New York and Langtry E. Lynd, of South Plainfield, N. J. The patent has been assigned to the National Lead Company of New York.

The lenses are made of a monocrystalline mass of the titanium compound, prepared at a temperature of 2,100° C. One of the features possessed by a lens fashioned from strontium titanate is an unusually high refractive index, compared to that obtained from lenses made from flint or crown glass. The new titanium lenses also possess a very low reciprocal relative dispersion. The new lenses are reputed to be very desirable for use as objective lenses in telescopes and microscopes; they are expected to prove superior also for achromatic lenses and prisms and other optical purposes where wide fields, high apertures, and short focal lengths are required.—*Science Service.*

Low Temperature Rubber

A new silicone rubber, known as SE-550, bends without cracking at temperatures as low as 120° below zero Fahrenheit. It was developed by the General Electric Company for use in special aircraft devices. It can be made into gaskets, sealings-rings for equipment, and wire insulation. The new silicone rubber will find many applications also in military ground equipment for use in the cold Arctic climates. It does not become brittle until it reaches temperatures well below minus 120° Fahrenheit. Yet, it resists heat very well, even temperatures of 500° Fahrenheit.

The new compound can be milled and extruded easily and resists tearing when pulled from hot molds.—*Science Service.*

Cosmic Calendar

**STRANGER
THAN
SCIENCE-
FICTION**

BY USING the instrument known as the *mass spectrometer*, it is now possible to calculate the age of the oldest substances on Earth. The most ancient minerals found on our planet so far seem to be somewhat over two billion years old. Arthur Holmes, geologist of the University of Edinburgh, suggests that our Earth is close to 3.3 billion years old.



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book reviews



Triplets

WITCHES THREE, by Fletcher Pratt, Fritz Leiber, and James Blish. Twayne Publishers, Inc., New York, 1952. 423 pages. \$3.95.

THE PETRIFIED PLANET, by Fletcher Pratt, H. Beam Piper, and Judith Merrill. 1952. 263 pages. \$2.95.

THE CONTINENT MAKERS, by L. Sprague de Camp. 1953. 272 pages. \$2.95.

WITCHES THREE, is in actuality, three novels of witches and werewolves and hauntings, told in a modern, rather than classic, gothic pattern. The strongest novel in the volume is Fritz Leiber's well-known *Conjure Wife*, which very effectively incorporates the psychological aspects of the horror story into the pattern of his tale; James Blish, in *There Shall Be No Darkness*, has a witch and a vampire which are scientifically, and quite ingeniously explained; Fletcher Pratt's *The Blue Star*, explains his contribution with humor and a dash of sex. As a collection of pseudo-scientific, fantasy-horror, the volume, within its limits, is very successful.

In *The Petrified Planet*, the hypothesis set up is that a world exists revolving around a distant sun, upon which conditions were favorable to the development of intelligent silicon-based life. Each of three well-known authors represented in the volume has written the idea from their own angle. *The Long View*, by Fletcher Pratt, *Uller Uprising*, by H.

Beam Piper, and *Daughters of Earth*, by Judith Merrill, are all competently written and to some extent entertaining, but this reviewer feels that the limitations hindered rather than helped the writers, and that taken as a group, the three stories are somewhat drab.

The Continent Makers represents a collection of Krishna stories by the ever-popular L. Sprague de Camp. The fantasy element in most of these tales is so negligible, as is indeed the science, that they are redeemed only by occasional clever and adroit writing. At their best they are little more than light entertainment.

Quadruplets

QUADRATIC, Four Science Fiction Novels, by Olaf Stapledon and Murray Leinster. The Fantasy Publishing Co., Inc., Los Angeles, Calif., 1953. 580 pages. \$3.50.

FANTASY TWINS, by L. Sprague de Camp and Stanley G. Weinbaum. 1953. 503 pages. \$3.50.

STRANGE WORLDS, by Ralph Milne Farley. 1953. 311 pages. \$3.00.

THE PLANET OF YOUTH, by Stanton A. Coblentz. 1952. 71 pages. \$1.50.

ALL THE above-listed titles are the product of one fantasy publishing company, issued in virtual unison. The first three listed consist of two separate books bound into a single omnibus volume, with substantial savings over the

price of the original individual volumes. These are handsomely and sturdily bound.

Quadratic contains three stories of Olaf Stapledon: *The Flames*, a well-done, philosophical science-fiction of flame-like creatures possessing intelligence; *Death Into Life*, a heavy, philosophical fantasy exploring the borderline between life and death; and *Old Man in a New World*, an ineffective attempt to depict the next possible evolution of a truly communistic state. Murray Leinster has included his old novel, *Murder Madness*, which is much more of a detective adventure story than fantasy.

Fantasy Twins features a mildly amusing duo of fantasies by L. Sprague de Camp, *The Undesired Princess* and *Mr. Arson*. It also includes *The Dark Other*, an unsuccessful attempt by Stanley G. Weinbaum to write a realistic combination science-fiction and sex novel.

Strange Worlds is composed completely of the works of Ralph Milne Farley, the most well-known of which is his novel, *The Radio Man*, a romantic science-fiction story in the tradition of Edgar Rice Burroughs. The short novel, *Hidden Universe*, and the short story, *We, the Mist*, both passable reading, round out the volume.

The Planet of Youth is published in book form for the first time, and relates, with considerable vigor and entertainment, the story of the first real estate boom on the planet Venus. It is an entertaining volume, perforce a rather skimpy one for the money.

Science Questions and Answers

Blowing Moisture into Space

Editor:

What do you think would happen if an atom bomb was dropped directly under a thunderstorm? Would any of the moisture be blown out into space? Would it be possible to blow moisture out into space with a hydrogen bomb?

Do we have any light powerful enough to signal Mars or Venus?

Do we have, or can we make radios that a landing party on Mars could use to contact the Earth?

Arthur Roy Kinzer
Hillsboro, Ohio

Answer:

Although the effect of an atom bomb may seem terrific to those directly within the area of its devastation, the explosive force is in fact a rather insignificant thing in terms of earth measurements. A thunderstorm may cover an area thousands of times larger. So the bomb would make only a small hole in it, but the radioactive rain may be bad for those on whom it falls.

The cloud produced by an atom bomb rises to a height of about 40,000 feet; much of it is moisture. Most likely, no moisture is driven to a height greater

than this. Water vapor maintains its vaporous form only within certain finite temperature limits. In the colder and higher reaches of the Earth's atmosphere it freezes. Assuming that charged particles are essential to cloud formation, there are sufficient charged particles present to bring about the coalescence of moisture following an atom blast, which may account for the density of the resulting cloud.

Although the explosive effect of the hydrogen bomb may be vastly greater than that of an atom bomb, it, too, would not blow moisture into space, even if it should become as powerful as hinted by former President Truman. On several occasions he implied that scientists foresee the day when an H-bomb will be able to produce an explosion great enough to annihilate all life on this planet. There is some question as to the meaning of "all life." Perhaps only subterranean creatures would be able to furnish the evolutionary start from which other kinds of life might spring. Live ants were picked up on the scene right after the Bikini test.

It should not be too difficult to signal Mars either with artificial light or with sunlight. Some of the disputed canals on Mars are from 10 to 15 miles across. It would seem that any ten-mile-square area

fitted with reflectors and operated like a heliostat might use sunlight for signalling effectively.

It seems likely that a party on Mars could signal the Earth by radio. The Earth's atmosphere may interfere more than that of Mars. The latter has an atmospheric density of from one-tenth to half that of the Earth. Radio signals have been sent to the moon and were reflected back to the Earth again where they were picked up. The possibility of doing this was first suggested by H. Gernsback, in an article written by him for the Feb., 1927 issue of *Radio News*.

This experimental proof showed that our atmosphere need not be too troublesome for signals to come through when wavelengths are properly selected. Signals also reach us from places in the universe which may be hundreds of light years away. Extensive research is now being conducted, and new telescopes already have been planned to record the activities taking place in what are known as "radio stars." The instrument which is used is the "radio telescope."

Thus it would appear distinctly possible to carry on two-way radio communication between Mars and the Earth. Venus offers no greater obstacles.—Editor.



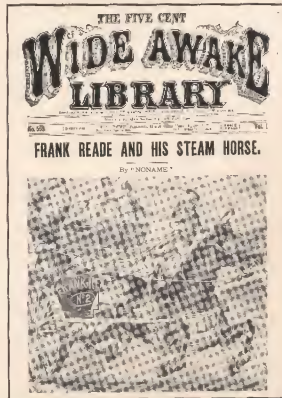
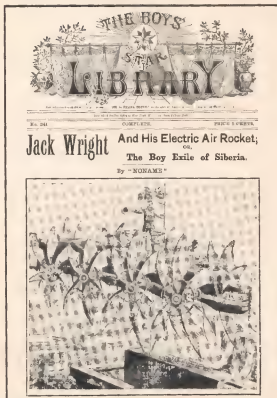
SCIENCE-FICTION DIME NOVELS

The closest approach to a science-fiction periodical published in this country before 1926 was undoubtedly the *Frank Reade Library*, begun by Frank Tousey in 1892 and continued on a weekly basis for almost four years afterward.

Though termed, in retrospect, "dime novels," that series, and others similar to it, actually sold for five cents a copy, were printed on pulp paper, and contained from 16 to 40 pages, depending upon the prosperity of the series and the length of the subject matter. Usually, a line-cut on the cover was the only illustration, but some, such as "Frank Reade, Jr., and His Queen Clipper of the Clouds," used as many as fifteen, very well-done drawings to illustrate each novel. The text was usually set in a microscopic six point type.

Author of that famous science-fiction series was Lou Senarens, who wrote under the pen name of "Noname." Actually, the Frank Reade stories appeared in the *Wide Awake Library* in the early eighties, when its author was but a teen-ager. The later *Frank Reade Library* reprinted the earlier stories and added new titles to the list.

"Noname" wrote a similar series about Jack Wright for *The Boys' Star Library*, but non-science-fiction titles were interspersed in this set. Favorite devices of Lou Senarens were manlike steam robots, steam horses, submarines, and diversified flying craft. Most of his submarines and airplanes were powered by electricity. Influenced by his success, other science-fiction occasionally appeared elsewhere.





Paul
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